In The Matter Of:

LIVINGSTON COUNTY ZONING BOARD OF APPEALS

DECEMBER 15, 2014
December 15, 2014

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 1        LIVINGSTON COUNTY ZONING BOARD OF APPEALS
                       CASE SU-7-14
 2          PLEASANT RIDGE WIND ENERGY PROJECT

 3                   December 15, 2014
                        6:30 PM
 4                    Walton Centre
                   Fairbury, Illinois
 5
                    BOARD MEMBERS
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                 Howard Zimmerman
 7               John Vitzthum
                  Joan Huisman
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1   (Commencing at 6:31 p.m.)

2   **CHAIRMAN CORNALE:** All right, if everybody

3 can find their ways to their seats, we can go ahead

4 and get started.

5   I would like to first start the evening

6 off and ask everyone for a moment of silence to

7 remember the lives of three young members of our

8 county and to many of you your community.

9   (Moment of silence.)

10   **CHAIRMAN CORNALE:** Thank you. Call this

11 meeting to order. Chuck, roll call please.

12   **MR. SCHOPP:** Okay, this is the December

13 15th, 2014, continuation hearing of the Livingston

14 County Zoning Board of Appeals review of the

15 Livingston County Zoning Case SU-7-14, Pleasant

16 Ridge Energy, LLC, Pleasant Ridge Wind Energy

17 Project. Michael Cornale?

18   **CHAIRMAN CORNALE:** Here.

19   **MR. SCHOPP:** John Vitzthum?

20   **MR. VITZTHUM:** Here.

21   **MR. SCHOPP:** Richard Kiefer? Diana

22 Iverson?

23   **MS. IVERSON:** Here.

24   **MR. SCHOPP:** Howard Zimmerman?

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1   **MR. ZIMMERMAN:** Here.

2   **MR. SCHOPP:** Joan Huisman.

3   **MS. HUISMAN:** Yes.

4   **MR. SCHOPP:** Gibs Nielsen.

5   **CHAIRMAN CORNALE:** All right. Certainly

6 like to thank everyone for being here this evening.

7 We'll continue. I understand from our previous

8 conversation that Mr. Hankard will be here this

9 evening. Mr. Roberts is here --

10   **MR. BLAZER:** That's correct, Mr. Chairman.

11   **CHAIRMAN CORNALE:** -- for questions. All

12 right. And Parzyck, Parzyck is here? Parzyck is

13 here, all right. Counsel, do we have anything to

14 add at this time?

15   Yeah, we'll do a little housekeeping here.

16 We've got a few exhibits that were presented during

17 questions. We've condensed it so we can just take

18 this all at once. These are Pleasant Ridge

19 exhibits.

20   UCLC 1, Kevin Parzyck, Invenergy, material

21 copy from the presentation given at the Illinois

22 Wind Working Group, Siting, Zoning and Taxing of

23 Farms in Illinois, Conference 2012. UCLC 2 is a

24 copy of Livingston County, Illinois, zoning

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1 regulations. UCLC 10 is a copy of an article titled
2 Preliminary studies on the reaction of growing geese
3 to the proximity of wind turbines. UCLC 13 is a
4 copy of the Livingston County Comprehensive Plan
5 Year 2020 Update. UCLC 14 is a copy of the official
6 filing before the Public Service Commission of
7 Wisconsin, Docket Number 2535-CE-100. And that is
8 direct testimony of JoAnne J. Blank. UCLC 15 is a
9 copy of a list of United Citizens of Livingston
10 County updated 11/19/2014.
11   An additional exhibit from Gerwin marked
12 as Gerwin 1. It's a map showing the location of
13 Fugate Woods Nature Preserve.
14   All right, with that, at this point -- all
15 right, we'll have the opportunity, the ZBA will have
16 the opportunity to question your witnesses. From
17 there, we'll move on to the units of local
18 government and interested parties represented by
19 licensed attorneys.
20   So at this point --
21   MR. LUETKEHANS: Mr. Chairman, just one
22 question. Does that mean -- I'm just trying to
23 understand. Does that mean Exhibits 1, 2 and 10, 13
24 and 14 of UCLC are in? Is that what's the point of

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1 what we're doing here?
2   CHAIRMAN CORNALE: We've accepted them in
3 so that they're on the record so we don't have to
4 deal with it later.
5   MR. LUETKEHANS: I just wanted to make
6 sure so I don't have to ask for it. Okay, thank
7 you.
8   CHAIRMAN CORNALE: Yes. All right, with
9 that, do we have any questions from our zoning board
10 members at this time? We certainly can reserve the
11 right.
12   MS. HUISMAN: Let's reserve.
13   CHAIRMAN CORNALE: All right, I might have
14 a couple. John, do you have any?
15   MR. VITZTHUM: (Shakes head).
16   CHAIRMAN CORNALE: All right. Mr.
17 Hankard, if you could come on up, I've got a few
18 questions for you.
19   MR. HANKARD: Good evening.
20   CHAIRMAN CORNALE: Good evening. Just as
21 a reminder, and a reminder to everyone, you have
22 been previously swore in. It's been a long time
23 since you testified. We don't have to go through
24 the process again because you have been -- you're

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1 still under oath from the original time.
2   QUESTIONS BY
3   **CHAIRMAN CORNALE:**
4   Q.   So with that, as I -- as I saw your
5 presentation and you took the data from the GE wind
6 turbines, in each of the columns that you selected
7 or that were there, they all had numbers above the
8 Illinois Pollution Control Board regulations. They
9 all had higher emission of noise, louder than the
10 Illinois Pollution Control Board; is that correct?
11   **A.   Are you talking about the data from the GE**
12 **documents?**
13   Q.   Yes, that you presented in your Power
14 Point.
15   **A.   Yes.**
16   Q.   Okay. So just so that I understand, if
17 you were to immediately stand underneath a tower, it
18 would not fulfill the pollution control
19 requirements.
20   **A.   Well, first of all, those numbers in the**
21 **table, in the GE documents, are what's called sound**
22 **power levels, so those are not what your ear**
23 **responds to, those are not what we measure with a**
24 **sound meter. It's a quantification of -- similar to**

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1 **a light bulb. It's wattage, but you don't measure**
2 **wattage, you actually measure lumens because that's**
3 **what your eyes are seeing. So just a clarification.**
4 **That's why those levels are much higher. Power**
5 **levels are always much higher than sound pressure**
6 **levels.**
7   **As to your question about standing under a**
8 **turbine, that's correct, you would exceed the code**
9 **if you measured noise directly under a turbine.**
10   Q.   Okay. So I guess that gets to my -- based
11 on the data that you have and the siting of the
12 towers in relation to homes, in all climatic
13 conditions, will any of them exceed the Illinois
14 Pollution Control Board regulations?
15   **A.   No, no, that is -- we do not believe they**
16 **will at all. The whole -- all the information we**
17 **presented regarding how we used the maximum analysis**
18 **possible and how we calibrated that against what we**
19 **measured over three and a half months at Cal Ridge.**
20 **And so I'm assuming that over those three and a half**
21 **months we witnessed a fair variety of atmospheric**
22 **conditions, and therefore if we don't exceed the**
23 **code after measuring for three and a half months,**
24 **then we're likely to not exceed the code under**

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1 another three and a half months, another three and a
2 half months, et cetera.
3   Q. Okay. The three and a half months that
4 you -- this is in the presentation, but just refresh
5 my memory as to what calendar months they were.
6   A. It started in August and it finished up in
7 late November.
8   Q. Okay. In your expert opinion, when would
9 sound be most likely to travel the greatest
10 distance? Months? Is it cold dense air? Is it
11 cold dry air? Is it warm moist air? Is it --
12   A. Right. The temperature and the humidity
13 aren't as important as what's called the stable
14 atmosphere. So when you have kind of a relatively
15 calm condition, of course you need high winds aloft,
16 relatively low wind on the ground, that's what's
17 called a gradient, thus there's a difference in the
18 ground wind versus the elevated wind, so that
19 situation tends to cause the noise waves to bend
20 down towards the earth. So it's more those stable
21 atmospheric conditions that are going to result in
22 the greatest propagation versus simply a given
23 temperature or relative humidity.
24   Q. You feel that the three months that you

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1 had adequately represented conditions such as that?
2   A. We do. In November, which is what we
3 relied on most heavily, we had what I would consider
4 excellent conditions for long range, you know, worst
5 case propagation. We listened to audio recordings
6 and the turbine noise was evident and there was very
7 little wind at the ground, yet we know the turbines
8 were operating at full capacity, so we know there
9 was a gradient present, which again it's that
10 gradient that's considered to be the worst case, so
11 I'm very confident that we captured that.
12   Q. All right, just a general question, I'm
13 refreshing my mind too, this was a month ago, at
14 what knot speed is wind noise overtaking the,
15 overtaking the noise of the tower? At what point is
16 there -- do you audibly pick up more wind noise than
17 tower noise?
18   A. Right. Generally speaking, it's about 5
19 meters per second, which it's 2.2 meters per second
20 per miles an hour, so it's roughly -- for those of
21 us who think more in miles an hour than meters per
22 second, it's roughly 10 miles an hour. So when
23 you're out with a sound level meter trying to
24 measure wind turbine noise or any other noise for

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1 that matter, once the wind gets to be about 10 miles
2 per hour, that's when that starts to overtake
3 whatever it is you're measuring.
4   Q. All right.
5   CHAIRMAN CORNALE: Do any other members of
6 the ZBA --
7   QUESTIONS BY
8   MS. HUISMAN:
9   Q. I'm looking at your presentation, there's
10 no page numbers on here, but it's one page that
11 addresses the low noise trailing edge that can be
12 added to the blade.
13   A. Yes.
14   Q. How does that work? I don't understand
15 what that -- what difference that would make and how
16 it would make a difference? Can you explain it?
17   A. I can explain it at a higher level. I'm
18 not part of the research that went into that, but
19 it's very interesting. It's actually -- the genesis
20 of that was the owl. So it's known that an owl
21 needs to be quiet, it swoops down on its prey, and
22 so they looked at an owl's wing and they realized
23 that there were small serrations, kind of like a
24 comb if you will, or a jagged edge, and they mimic

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1 that with the turbines and it works. To be honest
2 with you, I have not read in more detail to
3 understand the real detailed physical phenomenon
4 there, but that is -- that is where it came from.
5   Q. Have you researched or studied or measured
6 the difference in the blades that have the low noise
7 trailing edge added to it versus the blades that do
8 not?
9   A. I have not personally, but General
10 Electric has done extensive study and they have
11 measured the difference, and yet it is not just a
12 theory or a model, it has been verified in the field
13 using the international standard.
14   Q. I'm just curious. You put in your
15 presentation that these low noise wind turbine
16 blades are available to help meet the regulations,
17 so how -- in what circumstance would you as a noise
18 expert recommend that those be utilized?
19   A. Well, if we were to assemble the model of
20 a project, a client says to us here's where we want
21 to put our turbines and we assemble and we model.
22 And on our first run we say to them, well, at this
23 spot and this spot you are 3 decibels over the
24 limit, so you have choices now. You need to move

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1 turbines, remove turbines, operate them differently,
2 or you can add these low noise trailing edge blades.
3 And, you know, it's an economic decision on the part
4 of the client what works for them, but if they
5 choose the low noise trailing edge blades, then we
6 put that data into our model and rerun things and
7 improve compliance.
8 Q. You mentioned adjusting the turbine, so
9 adjusting like a speed then, you can do that in
10 order to adjust how much sound or noise is created
11 by that wind turbine?
12 A. That is an option, yes.
13 Q. Have you measured any of those differences
14 to be able to share with us how big of a difference
15 that makes?
16 A. Well, it's -- yeah, it's -- it's in the
17 report in a sense because that table that is from
18 the GE document, that explains the noise levels
19 versus wind speed, while the wind speed is also
20 really correlated to the speed -- to the rotational
21 speed of the turbines. So you can see in those
22 tables how as the wind speed increases, the noise
23 levels increase.
24 Again, the international standard that GE

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1 and every other turbine manufacturer uses mandates
2 that they measure turbines when they just start
3 rotating and then every meter per second or so as
4 things get faster. So the noise level versus wind
5 speed curves for these turbines is quite well-known.
6 MS. HUISMAN: Anyone else?
7 CHAIRMAN CORNALE: All right. At this
8 time we'll -- we're going to reserve the right to
9 ask further questions, but we'll move forward with
10 other interested parties. Units of local
11 government, school districts, are there any of those
12 entities here this evening that would like to ask a
13 question of Mr. Hankard? I don't see anybody.
14 All right. At this point, interested
15 parties represented by licensed attorneys.
16 QUESTIONS BY
17 MR. LUETKEHANS:
18 Q. How are you tonight, Mr. Hankard?
19 A. Good.
20 Q. A lot of this area is farming communities,
21 would you agree?
22 A. Farming communities? Yes.
23 Q. Okay. Would you agree with me that you're
24 not really all that versed in farming generally?

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1 A. I'm not a farmer.
2 Q. Have you ever spent a month living close
3 to a wind turbine?
4 A. Close as in 1,000 feet, 2,000 feet?
5 Q. Correct.
6 A. No, I have not spent a month.
7 Q. Okay. Your noise studies are a
8 prediction, correct?
9 A. The noise study for Pleasant Ridge?
10 Q. Yes.
11 A. Those are predictions, yes.
12 Q. Did you -- you did not perform any actual
13 background noise study at the Pleasant Ridge site
14 before running your model, correct?
15 A. Not at Pleasant Ridge, correct.
16 Q. My count shows that there are 61
17 nonparticipating receptors that your model shows at
18 41 decibels at 1,000 hertz. Would that be about
19 correct?
20 A. Yes, I believe that is about correct.
21 Q. Okay. What is the 41 hertz? What's the
22 significance?
23 A. The significance is that the Illinois
24 Pollution Control Board regulation at that octave

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1 band, 1,000 hertz, is 41, can't exceed 41.
2 Q. At any time. Not an average, it's
3 maximum, correct?
4 A. It's on a one hour what's called an
5 equivalent average basis, but yes, for any one hour
6 you can't exceed.
7 Q. Okay. And what did you -- you've used
8 receptor a number of times in your report and in
9 your testimony, at least in your Power Point and
10 your testimony. What were the receptors you were
11 measuring?
12 A. Receptor and residence were synonymous, so
13 we're talking about residences.
14 Q. Okay, so a home, physical location of a
15 home?
16 A. Correct, a physical house.
17 Q. And not the property lines, the physical
18 house.
19 A. Correct.
20 Q. You're not denying, are you, that at the
21 41 decibel maximum level that you discussed, there
22 are places where these turbines may emit over 41
23 decibels at the property lines. You wouldn't deny
24 that, would you?

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1 **A. I haven't done any predictions at property**
2 **lines. If they're significantly closer to the**
3 **turbines, then yes, the levels are going to be**
4 **louder.**
5 Q. Okay, so if I've got a house that was 500
6 feet back from my property line and I was at 41
7 decibels, there's a good chance that I may be more
8 than 41 decibels at the property line, correct?
9 **A. If you're closer to the turbine, then**
10 **there's certainly a chance that you're going to go**
11 **over 41 --**
12 Q. If that --
13 **A. -- if it's 500 feet closer, yes.**
14 Q. If the property line is, if the
15 property -- when you say closer, you mean if the
16 property line is closer, correct?
17 **A. Yes.**
18 Q. Just --
19 **A. Yeah.**
20 Q. Okay. It's also true that under the
21 report or under the proposal the turbines can be
22 moved 250 feet in any direction, correct?
23 **A. I'm not aware of that provision.**
24 Q. Okay. If a turbine was moved 250 feet

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1 closer to a residence, would that change your
2 analysis? Could that change -- one of those 61
3 receptors could be more than 41 decibels?
4 **A. 250 feet is a moderate change and that**
5 **could cause levels to increase if you're getting**
6 **them closer. Moving a turbine 250 feet closer to a**
7 **residence, yes, there's going to be some increase**
8 **there.**
9 Q. Okay. You know what a contour map is,
10 correct?
11 **A. A noise contour map, yes.**
12 Q. Yes, sorry.
13 **A. Yes.**
14 Q. Have you made those noise contour maps in
15 the past?
16 **A. Yes.**
17 Q. There's not -- you've put those in reports
18 that you've done in the past, correct?
19 **A. Indeed.**
20 Q. You have not provided one to this board or
21 in your report here, correct?
22 **A. We did not provide one as part of the**
23 **application I do not believe.**
24 Q. Okay. The 41 decibels, just so I'm clear,

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1 that's the max in your mind that can ever be reached
2 at any of the receptors.
3 **A. Again, in the noise world we have to be**
4 **careful with the term max because there is an actual**
5 **descriptor called Lmax, and that's -- that is not**
6 **the Illinois regulation. The Illinois regulation is**
7 **for a one hour LEQ, which, not to get too technical,**
8 **we'll call it an average, that one hour average**
9 **noise level cannot exceed that 41.**
10 Q. Okay. So during an average hour, if
11 you're at 41, you may have decibel -- points during
12 that hour that the decibels are higher than 41,
13 correct, at 1,000 hertz? Stay with 1,000 hertz.
14 **A. Sure. Yeah, do you understand that the**
15 **LEQ again is -- it's what's called an energy average**
16 **and it weights itself toward the louder levels, so**
17 **you can't -- you wouldn't, for example, have**
18 **something that's three, three louder, and then**
19 **something -- let's say you were -- at 30 minutes**
20 **you're three louder and 30 minutes you're three**
21 **quieter, and when you do your arithmetic math, that**
22 **would come out to be the average would be 41 or when**
23 **you -- an LEQ weights the louder levels higher so**
24 **you really can't go much above that 41 during that**

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1 **hour. If you do, it's going to pull your average**
2 **up.**
3 Q. Would you agree that it's 34 percent of
4 the time you could possibly be above that average?
5 **A. That would depend on how much you're above**
6 **the average.**
7 Q. Okay.
8 **A. You know what I mean?**
9 Q. Correct.
10 **A. Because it's a time versus level. They**
11 **both come into play.**
12 Q. But at certain numbers, at certain
13 percentages, if I was at 43, I could have up to 30
14 some percent above the average -- of that hour be
15 above the average.
16 **A. Yeah, I understand what you're asking and**
17 **I'm not arguing, I don't know the exact numbers, and**
18 **again it depends on the level. But yes, you could**
19 **be above that 41 for a brief time.**
20 Q. Okay. Okay, in your chart that you
21 provide in your report showing all the decibel
22 levels at the receptors, and I don't remember how
23 many receptors, there was a couple hundred or
24 something, those are all whole numbers; is that

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1 correct?
2 A. Yes. Integers, whole numbers, yes.
3 Q. Okay, for my simple math it's whole
4 numbers, but you're probably correct, it's integers
5 versus decibels, and I don't want to say decibels
6 because it has two meanings here, so --
7 A. Yes.
8 Q. Or decimals I guess.
9 A. Whole numbers is fine.
10 Q. Okay, whole numbers. Does your model
11 provide whole numbers or tenths of numbers?
12 A. The output of the Wind Pro model that we
13 used provides out to one-tenth of a decibel.
14 Q. Okay. So anywhere from -- okay. Were any
15 of those outputs over 41.0?
16 A. Yes, they were 41.1, 41.2, et cetera, yes.
17 Q. Okay. At what point would you round down
18 to 41 I guess is my next question? 41.4? 41.5?
19 A. To me, it's 41.4 and below is a 41; 41.5
20 and above is a 42.
21 Q. Okay. I think you said a couple times
22 maybe today and I think in the last hearing, and if
23 not, please correct me, that you calibrated the
24 model. Did you calibrate the model to -- or just

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1 use it as it's set up in the original ISO?
2 A. I differentiate between the terms
3 calibrate and validate if I may.
4 Q. Okay, please.
5 A. Calibrate to me means you changed
6 something. You compared your output to a
7 measurement, there was some difference, and then you
8 adjusted your model to close that gap so that you
9 predict exactly what you measured. That's to me
10 calibration.
11 Q. And I don't mean to interrupt. So what
12 you're saying is changing the model after you ran
13 it?
14 A. Yeah, you run it once, there's some
15 difference, you turn it a little, you make some
16 adjustments, so now it's right on with your
17 measurements. That's a calibration. That's a
18 change.
19 Q. Okay.
20 A. In my opinion, what we did was more
21 validate. We -- we compared it -- we ran our model,
22 we compared it to the output, to the measured
23 levels, and we said, well, we're below the measured
24 levels, so that's good. We're not going to change

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1 anything, we're not going to calibrate, we've just
2 essentially validated our -- that our predictions
3 are at least lower than what we expect in reality.
4 Q. Are there any modifications to the model
5 you did before -- I'll use modifications because you
6 don't like calibrate, but any modifications you did
7 to the model that you ran before you ran it?
8 A. No. We had discussions within the project
9 team early on about how we were going to model.
10 There's some professional judgment involved in how
11 you apply the ISO model. Different projects and --
12 apply it differently, particularly with respect to
13 what's called the ground factor. We made a decision
14 early on that we were going to go very conservative
15 with a zero ground factor and that is what we did.
16 Q. When you say ground factor, do you mean
17 attenuation? Is that the same as attenuation or is
18 that something different?
19 A. Ground factor is the actual term within
20 the ISO standard. Attenuation means to lessen a
21 level. And when you -- when you change the ground
22 factor in the model, it will increase or lessen
23 depending on how you change it.
24 Q. So you said there's certain professional

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1 judgment you make before you run the model?
2 A. Yes.
3 Q. Besides the ground factor, what are the
4 professional judgments that you make?
5 A. Most of the other modelling parameters are
6 fairly standard. For example, the atmospheric
7 attenuation coefficients, everybody pretty much uses
8 the exact same ones that we used. You can model the
9 effect of vegetation. We did not utilize any of
10 that and that's pretty common. So I would really
11 say that largely it boils down to the ground factor
12 choice.
13 Q. Okay. And what was the standard
14 atmospheric attenuation that you used?
15 A. I believe it's listed in the presentation.
16 I think it's for 10 degrees Celsius, 50 -- 50 or 70
17 percent relative humidity. It's pretty much the
18 lowest point you can use.
19 Q. Okay. What other professional judgments
20 or factors did you modify prior to running it? So
21 we have the ground factor, we have vegetation, which
22 were both zero, and then we have the atmosphere
23 attenuation. Anything else?
24 A. Let me just refer to my --

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1   Q. Please. It's not a memory. If you have
2 it, I would want you to give the proper --
3   **A. Sure.**
4   Q. I want you to know what you're saying.
5   **A. All right. Well, now -- so the original**
6 **power levels that go into the model, so this is the**
7 **data we get from GE.**
8   Q. Okay.
9   **A. This is, again back to the light bulb**
10 **analogy, is how much sound power is the turbine**
11 **putting out.**
12   Q. And that's different from RPMs, correct?
13 RPMs is the speed, is the power of the turbine or of
14 the --
15   **A. Well, let's -- just to be clear, there's**
16 **two powers here. Of course there's electrical**
17 **power, megawatts, electricity, but I'm talking about**
18 **sound power.**
19   Q. Correct, that's what I'm talking about, I
20 apologize.
21   **A. Okay, so back to your earlier question**
22 **what did we change. When we first -- when we first**
23 **submitted it, we submitted it, again back to the GE**
24 **table, to give you noise levels for every different**

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1 **wind speed. Because Illinois regulates nine**
2 **different levels, nine different octave bands, we**
3 **realized it wasn't a simple matter of choosing one**
4 **wind speed because at around I think it's 7 meters**
5 **per second 500 hertz is loudest, and at 10 meters**
6 **per second 1,000 hertz is loudest.**
7   **So at first we said, well, we'll go with**
8 **1,000 hertz, but then we came -- then we wanted to**
9 **add a more conservative aspect to the analysis, so**
10 **we -- that's when we went and chose the highest one**
11 **in every band. So I guess that was a change that**
12 **did occur.**
13   Q. Okay, but 1,000 hertz is where you're the
14 closest to the 41 throughout the project, correct?
15   **A. Per -- per the output of the model, yes,**
16 **that's correct.**
17   Q. Okay. Any other modifications you made in
18 your professional judgment?
19   **A. No.**
20   Q. Okay. You testified at the Highland Wind
21 hearing, correct?
22   **A. I did.**
23   Q. Did you use the same modelling program at
24 Highland Wind as you did here to model turbine

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1 noise?
2   **A. Yes.**
3   Q. So your modelling in this case is based on
4 a single point source of sound; is that correct?
5   **A. Each wind turbine is represented as its**
6 **own point, yes.**
7   Q. Okay. You were criticized at Highland
8 Wind for not looking at multiple sources along the
9 blade, weren't you?
10   **MR. BLAZER:** I'll object to that question.
11 It lacks any foundation. It's an improper question.
12 If Mr. Luetkehans has something he wants to show the
13 witness so he can determine what he means by you
14 were criticized, I think that would be appropriate.
15 Otherwise, it's an improper question.
16   **MR. LUETKEHANS:** If the witness
17 understands the question and is aware of it, he can
18 say it. If not, I can show him the document. I
19 think I have a right to see if he knows it.
20   **MR. BLAZER:** I think he has a right to see
21 the document to see what Mr. Luetkehans is talking
22 about.
23   **CHAIRMAN CORNALE:** Mr. Luetkehans, can you
24 restate the question without using -- I mean that's

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1 from another hearing. Can you try to take that out
2 of it? Is there something you're getting at,
3 getting at with that question?
4   **MR. LUETKEHANS:** Yeah, the point is that
5 there are other acousticians who disagree with using
6 a single point source and I want to know if he's --
7 if he -- I'm just asking him if he's been disagreed
8 with because he uses the single point source. It's
9 an easy question.
10   **MR. BLAZER:** Well, again, we don't know
11 who these other acousticians are or may be. We're
12 also -- if he's referring to Highland Wind, we're
13 dealing with a proceeding that took place in
14 Wisconsin not in Illinois. We don't know if the
15 same rules apply. So, again, I object without Mr.
16 Luetkehans showing him what document he's referring
17 to and putting it into some context.
18   **CHAIRMAN CORNALE:** Mr. Luetkehans, when
19 you asked the question single point source, how can
20 you get a multiple point source from a single
21 turbine?
22   **MR. LUETKEHANS:** I think you will find and
23 I think the evidence will show as we go through this
24 that you will find that experts believe that you get

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1 multiple point sources from a single turbine along
2 the blade, and I think I have a right to ask the
3 question.
4   **MR. BLAZER:** Well, it sounds like --
5   **CHAIRMAN CORNALE:** Okay, that's a good
6 question. Along the blade.
7   **MR. LUETKEHANS:** Well, if he didn't
8 understand the question -- I mean that's not what I
9 heard. I just heard Mr. Blazer object. If he wants
10 to say I don't understand the question, he
11 absolutely has that right and I'm willing to
12 rephrase.
13   **CHAIRMAN CORNALE:** Please.
14 **BY MR. LUETKEHANS:**
15   Q. You're aware that some acousticians
16 believe that you should be looking at multiple point
17 sources along a blade instead of a single source for
18 a turbine, correct?
19   **A. As far as Highland Wind test models, I do**
20 **not -- it was something like two years ago.**
21   Q. Now I'm asking a different question
22 because Mr. Blazer doesn't want me to ask the
23 question about Highland Wind.
24   **A. I don't know what other acousticians think**

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1 **about single point or multiple point. I know having**
2 **just read one of the best research papers looking at**
3 **individual sources of turbine noise that it's pretty**
4 **well-known that the down stroke of the blade on the**
5 **outer part of the blade is where most of the noise**
6 **comes from.**
7   **So to model, when you're talking about**
8 **being 1500, 1600, 1700 feet from a turbine,**
9 **modelling that with one point is very sufficient for**
10 **the purposes of this analysis. You can always break**
11 **something down into multiple points, but the**
12 **question is does it really do you any good for the**
13 **purpose of your analysis. And when you're looking**
14 **at something from these distances, it becomes a**
15 **point. That is my opinion.**
16   Q. That's your opinion. There are others
17 that hold different opinions on that, correct?
18   **A. There may be.**
19   Q. Okay. In fact, Mr. Lamancusa in Highland
20 Ridge or Highland Wind project specifically put in
21 testimony that disagreed with you and you were asked
22 to rebut that testimony.
23   **MR. BLAZER:** Objection.
24   **CHAIRMAN CORNALE:** Mr. Luetkehans, I think

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1 he did a great job answering the question, so let's
2 refrain from other testimony and other individuals.
3   **MR. LUETKEHANS:** Okay.
4   **CHAIRMAN CORNALE:** And use the testimony
5 that he's given to us.
6 **BY MR. LUETKEHANS:**
7   Q. The ISO model claims to be valid to plus
8 or minus three decibels for wind speeds between 1
9 and 5 meters per second measured at a height of 3 to
10 11 meters above ground; is that correct?
11   **A. That is correct.**
12   Q. Even at the levels that the ISO model
13 claims to be valid, it had a plus or minus 3 decibel
14 margin of error in essence, correct?
15   **A. If that is in ISO -- there are different**
16 **parameters that control the uncertainty of the ISO**
17 **model, but it is generally held to be plus or minus**
18 **3, yes.**
19   Q. So the 41 decibels we discussed at 61
20 nonparticipating receptors is actually somewhere
21 between 38 and 44 based on that accuracy level,
22 correct?
23   **A. No, because, again, this goes back to how**
24 **we did the model. For example, with the ground**

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1 **effect, the ground factor, using a zero ground**
2 **factor means that you think the entire area is paved**
3 **or covered with water and it's not; it's tilled**
4 **soil. So technically per the method we should use,**
5 **we'd be okay using 0.5. And there are other such**
6 **examples.**
7   **So to me, we use the model in a very**
8 **conservative manner, we double-check it against**
9 **measurements, long-term measurements, and we know**
10 **that our model predicts, you know -- it's consistent**
11 **with the maximum that we ever measured, and so**
12 **that's my way of checking on uncertainty.**
13   Q. We're going to get to your model and how
14 you checked against it at California Ridge. You'll
15 have that opportunity.
16   **A. Okay.**
17   Q. My question right now, though, is if you
18 were going to be completely conservative, you would
19 add plus 3 decibels, would you not?
20   **A. No.**
21   Q. Even though the margin of error for that
22 ISO model is plus or minus 3 decibels, correct?
23   **A. Again, that the ISO model, that the**
24 **value's valid. There are certain parts of it that**

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1 are only valid out to a thousand feet. We're using
2 it out beyond that. There are certain aspects that
3 say the source height shouldn't be more than 30
4 meters. Our source height is higher than that. So
5 there's a debate in my scientific community, well,
6 is this model valid? Um --
7 Q. Okay, so how high are the turbines?
8 MR. BLAZER: I don't believe he was done
9 answering the question, Mr. Chairman.
10 MR. LUETKEHANS: I apologize if he wasn't.
11 A. Yeah, I wasn't quite. And so, again, to
12 me, the way you deal with -- you know, we don't have
13 a different method. If -- and yes, there are some
14 methods that are being developed, but right now, for
15 guys like me doing these projects on a regular
16 basis, this is the overwhelmingly most common model
17 used in the United States.
18 So this is the model that I have. It has
19 uncertainties, it has limitations, and that is why I
20 like the way we went about it in checking it against
21 the real world, because beyond the 3 uncertainty,
22 it's just a fictitious number.
23 Q. Okay. You said in that answer that this
24 is the overwhelmingly used model and you also at one

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1 point said it was the only model available to you,
2 so I'm trying to understand which of those is the
3 correct statement.
4 A. It -- it's the overwhelmingly most
5 commonly used model. It is not the only model.
6 Q. There are other models that people use in
7 the United States, correct?
8 A. I do not think I have ever seen in the
9 United States anything other than ISO used for a
10 formal submittal.
11 Q. For a formal submittal. That means by the
12 wind energy, correct, wind energy company, correct?
13 A. Those are the people that do the
14 submittals.
15 Q. I just want to make it very clear. You've
16 seen it used by others, you just haven't -- you've
17 seen the other models used by others; you just
18 haven't seen the other models used by the wind
19 energy companies.
20 A. Right.
21 Q. Thanks.
22 A. I've seen research papers that compare
23 different models, and what those research papers
24 show is that when you use the ISO model with a zero

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1 ground, that is the most conservative method that
2 you can use, and so that's what we did.
3 Q. And what are the names of those papers?
4 A. I would have to check my records on that.
5 One of them was published in Sound and Vibration
6 Magazine I'm recalling.
7 Q. Okay, who wrote it?
8 A. I believe that was done by -- one of the
9 authors was Ken Kaliski.
10 Q. Can you spell Kaliski for this young lady
11 or the best you can?
12 A. Yeah, Kaliski, it's K-A-L-I-S-K-Y. Works
13 for a company called RSG out of White River
14 Junction, Vermont.
15 Q. Okay. And who does -- who does Mr.
16 Kaliski normally represent?
17 A. I'm not sure.
18 Q. Okay. Any other survey, any other studies
19 that you can think of?
20 A. There are one or two others, but I'd have
21 to check my notes on that.
22 Q. Okay. You said a couple minutes ago that
23 the turbines here are -- the turbines here are over
24 a hundred meters, correct?

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1 A. I believe these are 80 meter towers on
2 this project.
3 Q. Okay. So the -- but the blades are at how
4 high?
5 A. 80 plus 50 meters.
6 Q. Is that 5-0, I'm sorry?
7 A. 5-0.
8 Q. So 130 meters approximately?
9 A. Right.
10 Q. Okay. And as you said earlier, the ISO
11 model is built for up to 30 meters?
12 A. Well, again, it's a little bit of a
13 debate. It's not that the ISO model says that you
14 can't use it for something above 30 meters; it just
15 says that the uncertainties become greater above 30
16 meters.
17 Q. Okay. So we already have an uncertainty
18 of plus or minus 3 decibel levels, and now above 30
19 meters it becomes even greater.
20 MR. BLAZER: Object to that. The witness
21 has already discussed and rejected this notion of a
22 3 decibel uncertainty.
23 MR. LUETKEHANS: Oh, no, he didn't.
24 MR. BLAZER: Now he's trying to repeat the

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1 same question in a different way.
2   **MR. LUETKEHANS:** No, he didn't. He just
3 said he thinks he took care of it in the way he did
4 his conservative analysis. He didn't say plus or
5 minus 3 decibels wasn't. He agreed it was.
6   **MR. BLAZER:** Whatever he said, the record
7 will reflect that.
8   **CHAIRMAN CORNALE:** I believe that he did
9 agree that there was a plus or minus 3 component
10 within there. So, Mr. Luetkehans, just continue the
11 questions.
12 **BY MR. LUETKEHANS:**
13   Q. Well, I guess I'd just like an answer to
14 my question, which is we have -- we have a margin of
15 error plus or minus 3 decibels in the ISO at certain
16 levels, correct?
17   **A. (Nods head).**
18   Q. Is that a yes?
19   **A. I'm sorry, I'm sorry. Correct, correct.**
20   Q. I know you're nodding and she can't take
21 it, so that's all I'm trying to make clear.
22   So we add the uncertainty. We also have
23 on top of that an uncertainty that you just
24 mentioned of what happens when sound is at this case

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1 80, 130 meters above ground, correct?
2   **A. Correct.**
3   Q. Okay. Do you know what dynamic stall is?
4   **A. I do not know specifically what you mean**
5 **by dynamic stall.**
6   Q. Okay. Have you heard of dynamic stall?
7   **A. Not that term explicitly, no.**
8   Q. Okay. I think in your testimony you said
9 you previously worked with Rob Rand and Steve
10 Ambrose, correct?
11   **A. I used to work with those gentlemen 20**
12 **something years ago, yes.**
13   Q. Okay. At Stone and Webster?
14   **A. Yes, sir.**
15   Q. And when was that?
16   **A. I worked at Stone and Webster from 1990 to**
17 **1993.**
18   Q. And what year did you get out of -- I'll
19 back up. Do you have a bachelor's in engineering?
20   **A. Bachelor of science in electrical**
21 **engineering, yes.**
22   Q. Okay. Do you have a master's as well?
23   **A. No.**
24   Q. Okay. What year did you obtain your

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1 bachelor's of science in electrical engineering?
2   **A. 1990.**
3   Q. Okay. So Stone and Webster was your first
4 job right out of college?
5   **A. Indeed.**
6   Q. Okay. And what was the -- what was the
7 business of Stone and Webster?
8   **A. Stone and Webster designed power plants of**
9 **all sorts.**
10   Q. Okay. In that design, did you ever employ
11 what is called a design margin in your design work?
12   **A. At that time in my career, I was not, you**
13 **know, doing design work quite frankly. I was out**
14 **taking measurements and assisting with calculations.**
15   Q. At that time, did Stone and Webster use
16 design margins in their design work, if you know?
17   **A. I'm not -- I didn't do that sort of work.**
18 **I don't know.**
19   Q. Okay. However, you did not use design
20 margin here, correct?
21   **A. That, again, gets to the whole nature of**
22 **the validation process. That's our design margin,**
23 **if you will.**
24   Q. But you didn't add 2 or 3 decibels or

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1 whatever at the end of your modelling, correct?
2   **A. I did not just frivolously add a dB into a**
3 **calculation, no.**
4   Q. You also worked with Dr. Paul Schomer,
5 correct?
6   **A. Yes.**
7   Q. I think you called him a colleague and a
8 friend; is that correct?
9   **A. Yes.**
10   Q. And I think you said you respect him,
11 correct?
12   **A. I do.**
13   Q. Okay. And he has opined in a study that
14 he believes that the proper design holds 39
15 decibels; isn't that correct?
16   **A. I have seen Paul say that, yes.**
17   Q. And who is Hessler Associates?
18   **A. Hessler Associates is an acoustical**
19 **company, acoustical consulting firm, George and**
20 **David Hessler.**
21   Q. And they have opined -- you're aware that
22 they have opined a 40 decibel level as the proper
23 design level for avoiding complaints with wind
24 turbines, correct?

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1   **A. If you read what the Hesslers have written**
2 **over time, it's they have opined 40, but they've**
3 **also opined 45 from a regulatory standpoint.**
4   Q. Showing you what has been marked as UCLC
5 Exhibit 29, do you recognize this document?
6   **A. I'm sorry, was that a question to me?**
7   Q. Yeah. Do you recognize the document?
8   **A. Oh, yes, I do.**
9   Q. Okay. And in this document, this is one
10 of the times that Dr. Schomer and Hessler Associates
11 came up with this 39, 40 degrees -- or 40 decibel
12 level respectively, correct?
13   **A. I mean this study is not where they came**
14 **up with it.**
15   Q. Well, they've published in this study
16 those two levels.
17   **A. Can you show me where that is?**
18   Q. Yeah, at the bottom of page 7 of 13 is
19 the -- is the Hessler. I'll just read it to you for
20 the record. "Hessler Associates has summarized
21 their experience with wind turbines to date in a
22 peer reviewed journal and have concluded that
23 adverse impact is minimized if a design goal of 40
24 decibels -- I guess that's A-weighted decibel,

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1 right? -- long-term average is maintained at all
2 residences, at least at all nonparticipating
3 residences. To the best of their knowledge,
4 essentially no annoyance complaints and certainly no
5 severe health effect complaints, as reported at
6 Shirley, have been made known to them for all
7 projects designed to this goal." Do you see that?
8   **A. I do.**
9   Q. Okay. Now let's go to the top of the next
10 page.
11   **MR. BLAZER:** I'll object to this, Mr.
12 Chairman. This appears to be a study involving a
13 wind farm in Wisconsin evidently mentioned some
14 sound level at 40 decibels. Both the -- the IPCB
15 regulation, as this witness has testified, as you
16 well know, established what their requisite levels
17 are in the State of Illinois, and the county's
18 ordinance requires compliance with the IPCB,
19 Illinois Pollution Control Board, regulations, not
20 some study conducted for some unknown requirement in
21 the state of Wisconsin.
22   **MR. LUETKEHANS:** If I may respond?
23   **MR. BLAZER:** So this is irrelevant. It
24 has nothing to do with the regulatory requirements

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1 either in this county or in the State of Illinois.
2   **MR. LUETKEHANS:** If I may respond? The
3 health, safety and welfare is one of your standards
4 in your zoning ordinance. That's what this goes to.
5 What is the health, safety and welfare of the
6 residents of Livingston County and this goes to that
7 issue. It's not just 41 decibels. It is what is
8 the health, safety and welfare for your residents.
9   **MR. BLAZER:** Well, there's no evidence
10 that this Mr. Hessler, whoever he may be, sounds
11 like he's an acoustician, is a health expert, a
12 doctor, epidemiologist, neurologist or anything like
13 that. So, again, I don't know what his opinion
14 regarding the appropriate sound level in Wisconsin
15 has to do with the required sound levels in the
16 State of Illinois.
17   **CHAIRMAN CORNALE:** All right. Mr.
18 Luetkehans, we understand the relevance of the
19 health in this. Mr. Blazer, you are correct in that
20 it is a document from Wisconsin. In the effort of
21 hearing additional evidence possibly about a health
22 effect, we will allow you to continue some questions
23 with regard to this, but we will have the
24 opportunity to weight the testimony more or less

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1 because -- since it is something that has to do with
2 Wisconsin and not us, and the Illinois Pollution
3 Control Board does, in fact, regulate this state.
4 **BY MR. LUETKEHANS:**
5   Q. Let me ask a question. Is there anything
6 in Dr. Schomer's analysis or studies that we talked
7 about earlier, we talked about 39 decibels, or Mr.
8 Hessler of Hessler Associates that talks about 40
9 decibels, where they have limited that concept to
10 just the state of Wisconsin that you're aware of?
11   **MR. BLAZER:** Just for the record, Mr.
12 Chairman, I'll object to that because frankly it
13 doesn't matter what their opinion may be about where
14 this ought to apply or where it ought not to apply.
15 The standards of Illinois are what the standards of
16 Illinois are, and 39 and 40 are not the standards of
17 Illinois.
18   **CHAIRMAN CORNALE:** All right, we'll note
19 the objection. If you can answer his question to
20 the best of your ability, we'd like to hear the
21 answer.
22   **A. Would you repeat the question please?**
23   Q. I'll try. To the best of your knowledge,
24 has Dr. Schomer or the Hessler Associates ever

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1   limited the use of these two levels to just the
2   state of Wisconsin?
3   A. I do not believe they were limited to the
4   state of Wisconsin.
5   Q. Now I'm going to ask one last question on
6   this and we'll move on. Top of page 8 says "Schomer
7   and Associates, using an entirely different
8   approach, have concluded that a design goal of 39
9   dB(A) is adequate to minimize impact, at least for
10 an audible noise impact. In fact, a co-authored
11 paper is planned for an upcoming technical
12 conference in Montreal, Canada." Do you see that?
13   A. I do.
14   Q. Okay. What type of meter did you use,
15 noise meter did you use at California Ridge?
16   A. We had, let me see, a few different kinds
17 because we had multiple locations, but the study
18 really came down to two to three locations, and
19 those were, the manufacturer's Danish, Bruel and
20 Kjaer, B-R-U-E-L, K-J-A-E-R, their model 2250.
21   Q. Do you know what a Type 1 model meter is?
22   A. I do.
23   Q. Okay. And you know what a Type 2 meter is
24 I assume.

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1   A. I do.
2   Q. Which type -- was this one of those two
3   types of meters?
4   A. This meets Type 1.
5   Q. Okay. And the tolerance level for Type 1
6   is .7 decibels, correct?
7   A. Plus or minus, depends on frequency, but
8   yes, in a general sense it's seven-tenths of a
9   decibel.
10   Q. Okay. Did you include that design
11 tolerance in the numbers you provided this board in
12 your Power Point presentation for California Ridge?
13   A. No.
14   Q. Okay. As to California Ridge, what level
15 did you find at the 1,000 hertz level? It looks
16 like it's about 39, but I'm just trying to
17 understand the chart and I'm not -- just trying to
18 understand it.
19   A. Yeah, it is 39, yeah.
20   Q. Okay. Did you factor in any extended
21 uncertainty of 4.2 decibels at 1,000 hertz?
22   A. Could you repeat the question?
23   Q. Let me ask the question. At 1,000 hertz
24 there's an expanded uncertainty, correct, of 4.2

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1   decibels?
2   A. An expanded -- what are you referring to,
3   I'm sorry?
4   Q. Okay. Do you have handy somewhere
5   Pleasant Ridge Exhibit 48 which is your noise level
6   compliance analysis for California Ridge?
7   A. I believe I do.
8   Q. Okay. If you go to page 43 of that
9   report?
10   A. Yes.
11   Q. The bottom of the second paragraph goes,
12 states, "The expanded uncertainty is 3.5 decibels at
13 500 hertz and 4.2 decibels at 1,000 hertz or about 4
14 decibels overall." Do you see that?
15   A. I do.
16   Q. Okay. And then it goes on to the last
17 sentence of the next paragraph that says, "For
18 example, with a 4 decibel expanded uncertainty, one
19 can be 95 percent certain the measured level of 47
20 decibels, for example, is between 43 and 51
21 decibels." Do you see that?
22   A. I do.
23   Q. So would it be fair to say that we could
24 be 95 percent certain the measured level of 39

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1   decibels is somewhere between 35 and 43 decibels
2   approximately?
3   A. Not in my opinion, no. None of the levels
4   that we measured on Cal Ridge exceeded the 39.
5   None. So you can run a statistical analysis on a
6   database and you can come up with these
7   uncertainties all day long, but the bottom line is
8   we never measured anything louder than 39 at Cal
9   Ridge. So, yes, there's some scatter in the data
10 and, yes, you can run through the statistical
11 analyses, but to me that doesn't change the fact
12 that we never measured anything louder than 39.
13   Q. So the whole section on measurement
14 analysis uncertainty, why is it even in here?
15   A. Paul Schomer, who I collaborated with on
16 this, is the standards director for the Acoustical
17 Society of America and a long-term proponent of
18 doing these sorts of mathematical analyses, and he
19 felt it should be in there, and I was not in a
20 position to disagree with him and it's in there.
21   Q. Okay. So your collaborator on this
22 thought it was important?
23   A. Yes.
24   Q. And you either didn't disagree enough to

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1 say, no, we're not putting it in or didn't feel you
2 had the ability to disagree not to put it in?
3 **A. No, I had the ability. Paul and I had a**
4 **mutual respect. So it wasn't that I didn't have the**
5 **ability, but I -- I just -- again, it's an exercise**
6 **and there it is, and you can take from it what you**
7 **will. I keep going back to the fact that, I sound**
8 **like a broken record, we never measured a single**
9 **point louder. So you're asking me, well, could the**
10 **levels have been louder? Well, I guess they could**
11 **have been, but they weren't. Ever.**
12 Q. You -- the levels you testified to at
13 California Ridge, those were based on noise
14 separate -- where you separated out the wind turbine
15 noise from the background noise, correct?
16 **A. Yes. When you put a microphone out in a**
17 **field or wherever, it's measuring everything, and**
18 **then -- but the limits pertain to just the turbine**
19 **noise, so you have to separate out the turbine noise**
20 **from everything else.**
21 Q. And how is that done?
22 **A. In a couple different ways. To separate**
23 **out traffic and trains, which were the most**
24 **significant sources, or one of them, we used the**

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1 **time history. So you can see when you plot the**
2 **noise level versus time, you can see when a car goes**
3 **by, there's a clear spike in the level. So we kind**
4 **of set a threshold to eliminate those**
5 **traffic-related spikes. So that was how we dealt**
6 **with traffic. Wind noise was dealt with by limiting**
7 **the measurements to only when the wind speed on the**
8 **ground was 5 meters per second or less.**
9 Q. And so this was kind of your recommended
10 analogy that you came up with?
11 **A. It was our own procedure that Paul and I**
12 **developed, but it's all based on standards. For**
13 **example, the 5 meters per second is part of an ANSI**
14 **standard and the Illinois regulation actually**
15 **specifies that you have to do this. So you -- they**
16 **don't tell you exactly how to do it, but they tell**
17 **you that you have to do it.**
18 Q. Okay. The how-to-do-it is the question,
19 correct?
20 **A. Yes, the how-to-do-it is the question.**
21 Q. There's no industry standards as to how
22 you specifically do it, are there?
23 **A. Well, those are the tools that every**
24 **acoustician uses to separate things, you know, time,**

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1 **frequency content. That's another tool that we used**
2 **was you can -- the frequency spectre of a sound is**
3 **like its fingerprint, and we know what a turbine**
4 **fingerprint looks like, so we know what wind looks**
5 **like, we know what a car looks like, and so we also**
6 **used that. So between time, level, wind and**
7 **frequency, those were the tools that we used, and**
8 **those are the tools that have been used, you know,**
9 **for decades on multiple projects.**
10 Q. Okay. But how you use those tools is up
11 to you as doing the methodology, correct?
12 **A. Yeah, there's certainly professional**
13 **judgment involved.**
14 Q. Okay. And are there any peer reviewed
15 studies on how best to do that?
16 **A. Yeah, there are a number of studies.**
17 **Hessler has published a number of studies. He uses**
18 **a more statistical approach.**
19 Q. Okay. So he didn't use the approach you
20 used. He used a different one.
21 **A. Correct.**
22 Q. Okay. Are there any peer reviewed studies
23 because we heard a lot about peer reviewed studies
24 in the last month. Are there any peer reviewed

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1 studies that were done with the exact same
2 methodology that you used at California Ridge?
3 **A. Not that I'm aware of.**
4 Q. Okay. What turbine power levels were used
5 during the California Ridge survey?
6 **A. Turbine power levels? You mean electrical**
7 **power now?**
8 Q. Power, yeah. Not coming from but going
9 to. That they were -- you talked earlier there's
10 two kinds of power, one going into the grid and one
11 that is at the turbine, correct?
12 **A. Well, what I meant before about the two**
13 **different powers was sound power versus electrical**
14 **power.**
15 Q. And I'm talking sound power.
16 **A. Okay.**
17 Q. Or actually I'm not talking RPMs, I'm
18 talking power.
19 **A. Right. Electrical power, megawatts?**
20 Q. Sure.
21 **A. Yeah, we looked at -- again, when you're**
22 **trying to separate one source from another, you want**
23 **the source that you don't want to be very low, so**
24 **it's low traffic levels or low wind levels, and you**

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1 want the source that you're trying to identify to be
2 at its loudest such that the contrast between the
3 two is great and therefore easy to separate. So we
4 looked at only the hours where the turbines were
5 operating near or at their full electrical capacity.
6   Q. Is that in your report somewhere?
7   A. In the report it states that we separated
8 on RPM, 14 RPM or greater.
9   Q. Okay, but not on -- so not on electrical
10 power but RPMs. Those are two different things,
11 correct?
12   A. But they're hand in hand. If one goes up,
13 the other goes up. They --
14   Q. And during any portion of the test, did
15 the sound levels go over the Illinois Pollution
16 Control Board limits without you -- before you used
17 your methodology to take out the --
18   A. Oh, all the time, yeah, every time a car
19 goes by or what have you.
20   Q. Were you able to specifically confirm each
21 time what contributed to the exceedance over the 41
22 decibel level?
23   A. One minute please.
24   Q. Please.

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1   A. Refer to page 28.
2   Q. Okay. All right.
3   A. So page 28 shows the noise levels measured
4 at what we call prime two, which was the primary
5 measurement location, and the top table is 500
6 hertz, the bottom figure is 1,000 hertz.
7   Q. Uh-huh.
8   A. So let's look at a thousand. So you'll
9 see that, again, we're looking only at below 5
10 meters per second, so if you look at the X axis
11 you'll see wind speed. So if you look below 5
12 meters per second, there is no levels that are
13 above, that exceed 41. There were a few hours that
14 looked a little strange from a frequency standpoint
15 and we noted those, but even still they don't exceed
16 the limit. Now, this graph is only -- this does not
17 include a time with traffic and whatnot.
18   Q. So this is after you made your
19 methodology, your professional judgment?
20   A. Yes.
21   Q. Can you specifically -- there was one at
22 47. Do you know exactly what it was that took it
23 under 41?
24   A. Repeat the question please?

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1   Q. Okay. My question more is if I -- if
2 there were times when, let's say, the decibel level,
3 total decibel level was 47, or greater or less but
4 over 41, correct?
5   A. For a thousand hertz now?
6   Q. Yeah, let's stay with a thousand, it's
7 easier than --
8   A. Understood.
9   Q. -- going back and forth. Am I right about
10 that?
11   A. Well, yeah, let's refer then to actually
12 page 27 might get you the question a little better.
13   Q. Okay.
14   A. So it's a big table. There are -- the
15 first column is month, day, hour. The next two
16 columns -- let's look at the one, two, three, fifth
17 column over is a thousand hertz and that's without
18 anything being done to the level. That's just
19 straight up what we measured. And so are any of
20 those over 41? Yes, some of them are.
21   Q. Okay. So let's go to the number -- let's
22 go to the fifth down.
23   A. Sure. The 44?
24   Q. Yeah. Do you know exactly as we sit here

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1 today what was the reason for that being lowered
2 below 41?
3   A. Well, we have -- so that occurred on the
4 9th of November at 2200 hours. I remember that hour
5 quite well. It was -- that was one of our tougher
6 hours to separate, but you take the traffic out, and
7 right away you drop to 41.4. So just by taking --
8 and the traffic was the easiest thing to separate.
9 There was no question in our minds about that. So
10 the 41.4, you know, it's just below the limit. We
11 listened to the audio on that extensively, we could
12 hear turbines, there's no question that there's
13 turbine noise in there.
14   Q. Okay, so you went with -- so it was 41.4
15 even though the tolerance for Type 1 is .7 decibels,
16 correct?
17   A. You know, that's a plus or minus number.
18 These instruments are incredibly accurate.
19   Q. But it's plus or minus 7, .7.
20   A. .7.
21   Q. Yeah, okay. To run your model, you have
22 to rely upon data provided by the manufacturer,
23 correct?
24   A. Correct.

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1   Q. In this case, that data has a margin of
2 error that's provided by the manufacturer, correct?
3   **A. I believe they call it an uncertainty,**
4 **yes.**
5   Q. Okay. And what is that margin of error or
6 uncertainty that was provided by the manufacturer in
7 this case?
8   **A. Approximately 2 decibels.**
9   Q. So even at conditions validated for the
10 ISO model, we have a plus or minus 3 decibel margin
11 of error in the ISO model, plus a manufacturer's
12 margin of error of plus or minus 2 decibels,
13 correct?
14   **A. Correct.**
15   Q. Do you know, can you tell the board what
16 batch tolerance is?
17   **A. Batch tolerance. That might be a term in**
18 **the IDC's data, but I offhand do not recall.**
19   Q. Okay. But you did not include batch
20 tolerance in your report one way or the other?
21   **A. I don't believe so, but again, I'm not**
22 **really sure what you mean by batch tolerance.**
23   Q. Okay. Let's go to your Power Point if you
24 would.

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1   **A. Sure.**
2   Q. And I'm sorry, let's go to page 48.
3   **A. Which page?**
4   Q. You know what? I labeled it 48, but it's
5 the next to the last page.
6   **A. Okay. What's the title?**
7   Q. Real World Wind Turbine Noise Complaint
8 Rates.
9   **A. Yes.**
10   Q. Okay. Why is the Cayuga Ridge letter in
11 here?
12   **A. Well, it's -- it's the closest wind**
13 **turbine farm or it's in this county, so it's**
14 **therefore relevant from a geographical standpoint.**
15   Q. Okay. And it's not an Invenergy project
16 though, correct?
17   **A. Correct.**
18   Q. Okay. And do you know what the decibel
19 levels predicted at those homes were?
20   **A. No. They had to meet Illinois Pollution**
21 **Control Board regulations.**
22   Q. So all we know is they were somewhere
23 below 41?
24   **A. I have not reviewed any of the noise study**

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1 **for that project.**
2   Q. Okay. But they could have been 35 for all
3 we know as we sit here today.
4   **A. I -- I don't know.**
5   Q. Okay. California Ridge is an Invenergy
6 project, correct?
7   **A. Yes.**
8   Q. And that's how far from here would you
9 say?
10   **A. I don't know. 50 miles. I'm -- I'm**
11 **guessing here.**
12   Q. It's in Vermilion County.
13   **A. Yes, part of it.**
14   Q. And you, however, did not -- you cannot
15 say, can you, that there have been no complaints
16 about noise in California Ridge?
17   **A. No, it would be hard to say there have**
18 **been no complaints.**
19   Q. Okay.
20   **CHAIRMAN CORNALE:** Mr. Luetkehans, I've
21 got 7:40. Why don't we take a ten minute break. So
22 about ten to 8:00 we'll get going again.
23   (Recess at 7:41 p.m. to 7:51 p.m.)
24   **CHAIRMAN CORNALE:** All right, Mr.

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1 Luetkehans, you can go ahead and continue.
2 **BY MR. LUETKEHANS:**
3   Q. Mr. Hankard, I'll ask you about your Power
4 Point presentation for a few minutes. We'll
5 probably flip back and forth, I apologize, but the
6 page before we were just looking at, it's the third
7 from the end, it says Misapplication of EPA
8 Community Reaction Model.
9   **A. Yes, I see that.**
10   Q. Do you have that page? Okay. This is one
11 of the charts I -- you were going a little quick for
12 me, so I apologize if I'm asking you to do things
13 over again, but I really want to understand the
14 charts, these couple charts.
15   This chart and specifically the main point
16 of this chart is this orangish-reddish line. Is
17 that really what we're showing here?
18   **A. Well, again, this chart was produced by --**
19 **I don't know if it's Rob Rand or Rob Rand and Steve**
20 **Ambrose, Rand and Ambrose. And of course the chart,**
21 **the base chart was prepared by the EPA back in the**
22 **'70s.**
23   Q. Okay.
24   **A. They overlaid some research that was done**

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1 in Europe in the 2000s on top of that, so there's
2 kind of -- there's really two pieces of data that
3 are there.
4 Q. Okay. Why don't you explain those because
5 I got lost there, so if you could explain it again,
6 I apologize.
7 A. Okay, no problem. So the base chart, all
8 the black little squares and the axis and -- the X
9 axis is the noise levels, and then the Y axis, the
10 no reactions, sporadic complaints, widespread
11 complaints, all that.
12 Q. Uh-huh.
13 A. So what the EPA did back in the '70s is
14 they -- this is based on a lot of airport noise,
15 transportation noise. Back in the early '70s the
16 United States Government instituted an Office of
17 Noise within the EPA. It ended up getting axed, so
18 it never came to pass. They had a noise regulation
19 ready to go for a nationwide regulation. It never
20 saw the light of day. But this research was what
21 led -- was part of that.
22   So they took a bunch of noise levels from
23 different sources and tried to relate it to how
24 people would react. So let's look at 40, 40

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1 decibels on the X axis. You follow that up to kind
2 of the trend line that those black squares make and
3 you would say that gives me widespread complaints.
4 So if I have a new source of sound, it's going to
5 produce 40 decibels, I can get widespread
6 complaints.
7 Q. Okay. Let's go to two pages before that.
8 Outer hair cell threshold.
9 A. Yes.
10 Q. And this is related to infrasound, and I
11 think you said infrasound is, and I'm not -- please
12 tell me if I'm wrong, but is the concern about
13 infrasound is between zero and 20 hertz.
14 A. Yeah, generally you'll see people use 16
15 or different numbers, but yeah, overwhelmingly zero
16 hertz and 20 hertz is the infrasonic range.
17 Q. Okay. And at the point where the outer
18 hair cell threshold and the hertz combine or meet is
19 at 20 hertz in your mind, correct? Is that what
20 you're saying there with where they cross each
21 other?
22 A. No. What I'm saying here is so -- and of
23 course it's not my work, it's the work of a man by
24 the last name of Salt, and what he has proposed is

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1 that there's a possibility that the -- in human
2 hearing, there's inner hair cells and outer hair
3 cells that are within our inner ear, so down inside
4 our ear we have these two different sets of hair
5 cells. Classical hearing takes place via the inner
6 hair cells and that is what the known thresholds of
7 audibility are based on.
8 Q. Okay.
9 A. And what Dr. Salt has proposed is that,
10 vis-a-vis some experiments he did on guinea pigs, is
11 there might be another hearing, another mechanism
12 for sound to get to our brains ultimately for us to
13 react to it. And so he just proposed this lower
14 threshold, this outer hair cell threshold. So, for
15 example, at 1 hertz, the noise level would have to
16 be 100 decibels in order -- you know, would have to
17 be over 100 in order to be heard at --
18 Q. So the -- I don't mean to cut you off, but
19 the black dotted line is Salt's --
20 A. Threshold, right. You have to be above
21 that in order for it to register in these outer hair
22 cells.
23 Q. And the Shirley cooperative study went
24 over that or matched that at 20.

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1 A. Yeah, at about 20 hertz, that's where it
2 starts to be over the threshold.
3 Q. Okay. Let's go back to page -- three
4 pages later talks about real turbine noise complaint
5 rates. That's the page we talked about earlier.
6 A. Right, right.
7 Q. You would agree with me that your model
8 cannot predict annoyance and/or health complaints
9 that will occur; is that correct?
10 A. The ISO model?
11 Q. Yeah.
12 A. That just predicts the levels.
13 Q. Okay. So that would be a fair statement
14 that I just made.
15 A. Yeah, it does not predict anything but
16 noise levels.
17 Q. Okay. You are aware that some people say
18 they are bothered by wind turbines though, correct?
19 You're aware those complaints have been made?
20 A. Certainly.
21 Q. And I think what you're saying on this
22 page of your Power Point presentation, which for the
23 record is Exhibit -- Pleasant Ridge Exhibit 50, is
24 that Hessler found a range of 2 percent to 7 percent

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1 complaints, correct?
2   MR. BLAZER: I believe it says 5.
3   Q. Yeah, but he corrected it that it was 7;
4 is that correct?
5   A. Correct.
6   Q. Okay, you're right, it says 5 on the
7 thing, but --
8   A. Yes. Yeah, I reread the Hessler study
9 right before and I --
10   Q. No one's holding you to it. You cleaned
11 it up right away. I'm not sitting here trying to
12 say you were lying or messed up, okay?
13   A. Fair enough.
14   Q. Stuff happens, we all understand that.
15 And that do we know what decibel levels or how far
16 out these people were surveyed, how far from the
17 turbines?
18   A. On the Hessler studies?
19   Q. Yes.
20   A. It's -- it's a range. It's people -- you
21 know, most of these projects that Hessler had in his
22 study were Midwest projects, so, you know, it's the
23 same types of distances that will be associated here
24 with Pleasant Ridge. I don't know explicitly what

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1 distances.
2   Q. But we don't know how far out he went at
3 least as you sit here. Do you know if he went out
4 to five miles, mile and a half, three miles? We
5 just don't know.
6   A. I don't know, I don't recall offhand how
7 far out he went.
8   Q. Okay. And would that be the same for the
9 Health Canada Prince Edward study and the Benton
10 County, Indiana, study? We just don't know how far
11 out these were.
12   A. That has not been standardized how far out
13 do you go and that does play a part in what
14 percentage you get.
15   Q. Obviously if you went out ten miles your
16 percentage would be much lower than two miles,
17 correct?
18   A. Correct.
19   Q. Okay. If I just averaged these out, I'd
20 be somewhere in the 5 percent range, correct? Just
21 kind of ballparking it 2 to 7, kind of -- I'm below
22 the top and above the lowest.
23   A. Yeah, the average on Hessler was 4
24 percent, so yeah, 4, 5.

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1   Q. I might even be a little higher than that,
2 but we'll go with 5 percent, which is 1 in 20,
3 correct?
4   A. Yes.
5   Q. Okay. Just so I make sure I know what the
6 heck I'm saying, I'm just trying to clear it up.
7   A. Right.
8   Q. I believe Mr. Downey testified that there
9 were over 650 residences within one mile of the
10 project. Were you here for that or did you hear
11 that testimony?
12   A. I -- I know I've seen numbers up around
13 700. You just said 650.
14   Q. It might be 653 or something, I don't
15 remember exactly, but --
16   A. Okay.
17   Q. Let's just take 650 because it's a nice
18 round number.
19   A. Okay.
20   Q. And would you -- how many people would you
21 say average live in a house? Can we say three is a
22 conservative number?
23   A. I mean out in this part of -- I don't
24 know.

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1   Q. Okay.
2   A. Family of four.
3   Q. Let's just take three for now because I
4 don't think that's a high number, would you agree I
5 mean? So 5 percent of that number, 2,000, and three
6 times 650 which is 1950, okay, would be a hundred
7 people. Would you agree with me?
8   A. Could you do that again?
9   Q. Yeah, sorry, I got through it quick. We
10 got 650 residences. You and I are -- I'm not -- in
11 my hypothetical --
12   A. 650 times three.
13   Q. 1950. I'll round it to 2000.
14   A. Okay.
15   Q. So that would be -- 50 percent of 2000
16 would be a hundred people. Or 5 percent of 2000
17 would be a hundred people, correct?
18   A. Yes.
19   Q. So that's within one mile, those people
20 living within one mile, if you just took these
21 surveys and said they were only one mile, which we
22 don't know if they are, probably weren't, we know at
23 least -- we know approximately a hundred people
24 would be complaining, correct?

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1   **MR. BLAZER:** Objection. This is complete
2 speculation.
3   **MR. LUETKEHANS:** I'm using his numbers.
4   **CHAIRMAN CORNALE:** Mr. Luetkehans, he
5 hasn't testified any at all to how many people
6 reside in a house. He was not here for the
7 questioning of Mr. Downey. He wasn't -- I think the
8 number was 657 Mr. Downey gave us, but he wasn't
9 here for that. So all these questions, it might be
10 5,000. We don't know. Could be 1,000. It's
11 speculative.
12   **MR. LUETKEHANS:** I --
13   **CHAIRMAN CORNALE:** It's not helping.
14   **MR. LUETKEHANS:** I think I have the right
15 to give a hypothetical and to show numbers and
16 that's all I'm doing here.
17   **CHAIRMAN CORNALE:** He's presented the
18 percentage. I think we'll leave it at that.
19   **MR. LUETKEHANS:** Nothing further, Mr.
20 Hankard, at this time.
21   **A. Thank you.**
22   **CHAIRMAN CORNALE:** Mr. Hankard, I have a
23 few more questions just to clarify a few things.
24   QUESTIONS BY

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1   **CHAIRMAN CORNALE:**
2 Q. The Cal Ridge turbines that you did some
3 modelling with, are they the same model as the
4 proposed here?
5 **A. No.**
6 Q. They're not?
7 **A. They were not. The GE 1.6 versus a GE 1.7**
8 **on Pleasant Ridge.**
9 Q. Okay. All right. Okay, let me -- you
10 talked about limits of your testing equipment.
11 **A. As in the Type 1, Type 2?**
12 Q. No. In the original testimony you spoke
13 of limits at the lower level. Remind me again what
14 that -- it was a certain hertz.
15 **A. Oh.**
16 Q. I think it was -- was it in the 6s, the
17 7s?
18 **A. Yes. So measurement equipment is rated to**
19 **measure accurately within a certain frequency range,**
20 **and when you get down to the very low frequencies,**
21 **single hertz, 1, 2, 3, 4, 5 or 6, what have you, you**
22 **have to make sure that your equipment meets the**
23 **specification of what you're trying to achieve. And**
24 **again, we're really only trying to achieve for**

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1 **Illinois Pollution Control Board regulation**
2 **compliance down to about 20 hertz, because that**
3 **lowest band, the 31 hertz band that the Illinois**
4 **regulates, the lowest -- you know, that's the**
5 **center, 31.5 is the center of that band; the low end**
6 **of that band is about 20 hertz. So that's really**
7 **all we're required to do. The equipment that we**
8 **utilized, I believe it's rated down to 6 hertz.**
9 Q. Okay, so let me ask this. Below 6 hertz,
10 sound is still produced. It's still energy,
11 moreover vibration.
12 **A. It's still sound energy, yes.**
13 Q. Okay. Is it vibration?
14 **A. Well, you know, sound and vibration are**
15 **always cousins. I mean when the blade goes through**
16 **the air, it vibrates, but then it -- so it's**
17 **vibrating, but then it pushes air which creates**
18 **sound pressure. Sound pressure is kind of like**
19 **vibrating air.**
20 Q. Okay.
21 **A. And then when a sound wave hits a**
22 **building, for example, it vibrates, then it turns**
23 **back into physical vibration of a structure. And**
24 **then you get inside the building and it then pushes**

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1 **the air again and then it's a vibration of air. So**
2 **they're kind of related.**
3 Q. Okay. And the reason I'm getting at this,
4 because you actually brought this to light, was with
5 the Navy study you presented, we quickly went
6 through it, I think there was a -- you kind of said
7 it was very complicated and I didn't understand it
8 all, but what I did understand from it was as you
9 got into the lower hertz, that's where you seen the
10 physical symptoms.
11 **A. That is what people who have purported**
12 **these, that infrasound causes health impacts, have**
13 **started -- as I read all of the research, they're**
14 **really saying that it's down in the 1, 2, 3, 4, 5**
15 **hertz range. It's very low, yes. That's what is**
16 **out in the literature.**
17 Q. Okay. So that's below your sound
18 equipment testing capability.
19 **A. Yeah, the meters that we used on this**
20 **project are -- I really shouldn't be using that to**
21 **go down to, say, 1 hertz. That would not be**
22 **appropriate.**
23 Q. Okay. Have you, have you followed any of
24 this up with vibration analysis? I mean since you

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1 can't test it for sound, can you test it for
2 vibration or the physical -- can you test a physical
3 structure? Is there a byproduct or an erosion of
4 sound that transfers into the physical structure?
5 **A. I'm honestly not sure I understand the**
6 **question. Could you --**
7 Q. Okay. So you have a hertz, let's say 1
8 hertz.
9 **A. Sure.**
10 Q. Passes through the air, is transmitted
11 through the air, hits a physical structure, begins
12 to physically vibrate at 1 hertz or something there
13 less. My question is are we approaching that less
14 that you presented to us with the Navy study?
15 **A. Well, the Navy study again was this --**
16 **they tested pilots, so they put them in a machine**
17 **and physically shook them, so they shook the whole**
18 **body at 1 hertz. So that was the point I was trying**
19 **to draw in the presentation is that sound coming at**
20 **me and vibrating in my ear or my body is, in my**
21 **opinion, very different than me stepping into a**
22 **machine and being shook, you know. You might -- the**
23 **same forces might be involved, but it's a very**
24 **different way of getting there.**

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1 Q. 1 hertz would be one oscillation per
2 second?
3 **A. Correct.**
4 Q. Okay. So not that rigorous of a shake?
5 **A. Well, that's just the rate at which you're**
6 **being shaken. The degree of vigor would be measured**
7 **in Gs. You've heard that perhaps with astronauts**
8 **being subjected to certain G forces. So you can**
9 **shake somebody at 1 hertz gently or you can shake**
10 **them very vigorously, but the frequency of the**
11 **shaking doesn't change. The intensity does.**
12 Q. Okay. And the intensity shown in your
13 figures, you're going to have to help me with this
14 because I don't have that study, it's in your Power
15 Point?
16 **A. It is, yes. That the G forces of that**
17 **study are listed there.**
18 Q. Okay. How many G forces are we -- what's
19 the range, just so I can clear this out of my mind
20 that it is not --
21 **A. Right. Well, here in this Navy study, you**
22 **know, I see G forces on the very low end of .01 and**
23 **on the very high end of 1, so we're somewhere**
24 **between say zero and 1 G.**

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1 Q. Okay. So zero is nothing, no additional
2 impact on the body, and 1 G is dealt with --
3 **A. Well, trying -- you can measure vibration**
4 **three ways, displacement, velocity and acceleration,**
5 **and I'm going to try not to get technical here, but**
6 **acceleration is what G is, so it's how -- it's the**
7 **rate of change of -- I don't know how to simplify**
8 **it.**
9 Q. 1 G will pull twice the weight on a body,
10 on a human body.
11 **A. You know, I'd have to think about that. I**
12 **don't work with Gs very often. This was not, you**
13 **know, my study, and we don't tend to measure**
14 **vibration of a human body. We stick with the sound**
15 **levels.**
16 Q. Okay.
17 **A. I'm certainly not trying to avoid your**
18 **question --**
19 Q. I understand.
20 **A. -- so feel free to rephrase.**
21 Q. Unfortunately you put it in there and now
22 you piqued my interest in the Navy study that shakes
23 people and bad things happen. With respect to its
24 similarity to low hertz frequencies that you're

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1 unable to measure, there's a hole in the -- I feel
2 like there's a hole here that we are -- where you
3 presented this, but then you're not giving us
4 anything to work with.
5 **A. Sure, okay. Let me tell you one thing**
6 **here that might help explain this. So the way the**
7 **ear works inside your ear, you have again like hairs**
8 **that are inside a fluid. And the way Paul Schomer**
9 **explains it, you have this small piece of I believe**
10 **it's cartilage called the otolith. The otolith,**
11 **again, is in this fluid, and if the otolith moves,**
12 **that sends a signal to the brain that there was some**
13 **sound, okay? The greater the intensity of the**
14 **sound, the more the otolith is going to move.**
15 **Well, the Navy by shaking -- you can get**
16 **the otolith to move by shaking the body too. It's**
17 **kind of the opposite. So instead of a sound wave**
18 **coming in and moving the fluid, now you're shaking**
19 **the whole thing and again the otolith is moving.**
20 **And what Paul Schomer said is that those**
21 **are two different ways of achieving the same thing,**
22 **which is the movement of the otolith, which then**
23 **tells the brain that, hey, I'm being moved. And so**
24 **he was saying that, well, the sound coming in is**

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1   kind of, can be thought of in the same way as
2   shaking the body, at least in terms of the forces on
3   the inner ear, on the otolith.
4   Q.   Okay. To replicate that simply, 1 G of
5   pull and one oscillation of hertz would be the same
6   replication. You could be in a -- okay, I'll leave
7   it at that.
8   All right. And I think you got to this.
9   Will erosion of less than 20 hertz sound, or any
10 sound as it hits objects, become closer to zero
11 hertz? Does it break down, does -- does sound break
12 down or does it continue with the same intensity as
13 it hits a physical object?
14   A.   Well, when sound hits a wall, the exterior
15 wall of a house, that energy goes into moving the
16 wall. It's literally physically moving the wall.
17 So now that sound energy is created, is transformed
18 into vibratory energy, and then it continues on on
19 the other side.
20   But yes, there's -- the intensity of the
21 sound is, of course, much less on the other side of
22 the wall because it lost energy by moving the wall.
23 Literally you convert sound energy to mechanical
24 energy. Some of it makes its way through because

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1   you move the wall. Then the wall ends up creating
2   sound inside.
3   So, again, you have a certain intensity
4   outside, it moves the wall, some of the energy is
5   converted and lost, and some of it continues on as
6   sound energy inside at a lower level.
7   Q.   Okay, very good, thank you. That was all
8   my questions. Very good, thank you, Mr. Hankard.
9   CHAIRMAN CORNALE: Mr. Luetkehans, do you
10 have further questions?
11   MR. LUETKEHANS: (Shakes head).
12   CHAIRMAN CORNALE: All right, Mr.
13 Luetkehans, do you have any questions for our other
14 witness this evening?
15   MR. LUETKEHANS: Mr. Roberts. No, I guess
16 the question becomes do you want to do -- I don't
17 know if Mr. Hankard is planning on staying. I know
18 we have issues with time and Mr. Ellenbogen, Dr.
19 Ellenbogen --
20   MR. BLAZER: They're both here.
21   MR. LUETKEHANS: Okay, I didn't know,
22 okay, and I'm happy to start Mr. Roberts. I just
23 wanted to make sure we didn't want to have the other
24 people question Mr. Hankard since he's here.

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1   MR. BLAZER: He'll be back Wednesday.
2   CHAIRMAN CORNALE: Okay, Mr. Luetkehans,
3   why don't you --
4   MR. LUETKEHANS: That's fine, thank you.
5   Yeah, give me about 30 seconds.
6   CHAIRMAN CORNALE: Okay. While Mr.
7   Luetkehans is finding his material, just as a matter
8   here, is there any units of government or school
9   board that may have any questions of our next
10 witness, Dr. Roberts? Nobody out there? All right.
11   Okay. Mr. Luetkehans, you may proceed.
12   QUESTIONS BY
13   MR. LUETKEHANS:
14   Q.   Good evening, Dr. Roberts. Are you a
15 practicing clinical physician?
16   A.   I am licensed in three states, Illinois,
17 Wisconsin and Oklahoma.
18   Q.   Are you a practicing clinical physician?
19   A.   That makes me a practicing physician.
20   Q.   Do you regularly see and treat patients?
21   A.   As an occupational medicine physician,
22 yes.
23   Q.   What does that mean by an occupational
24 medicine physician?

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1   A.   An occupational medicine physician is a
2   physician that works with employees primarily, but
3   also I look at environmental issues. And so do I
4   wear a white coat and carry a stethoscope on a daily
5   basis? No, I do not.
6   Q.   Okay. So you don't treat patients daily?
7   A.   I answer patient questions daily, yes.
8   Q.   Okay. But do you have an office where you
9   have appointments every day? That's my question.
10   A.   No, I don't. I have an office, but I
11 don't take appointments.
12   Q.   Okay.
13   AUDIENCE VOICE: We can't hear.
14   MR. LUETKEHANS: Sorry, I'll speak a
15 little louder.
16   CHAIRMAN CORNALE: Dr. Roberts, can you
17 speak a little closer to it and we may have to turn
18 it up a little bit.
19   DR. ROBERTS: Why don't you turn me up a
20 little bit.
21   CHAIRMAN CORNALE: I'm not sure which one
22 you're on, so just check for me.
23   DR. ROBERTS: Try this. I'll keep
24 talking. How is that in the back? Better?

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1   AUDIENCE VOICE: Right.
2   DR. ROBERTS: All right, I see lots of
3 nodding heads. Let's go.
4 BY MR. LUETKEHANS:
5   Q. Have you examined any patient who has
6 claimed to have had adverse health effects resulting
7 from wind turbines?
8   A. No, I have not.
9   Q. Are you aware of complaints of people who
10 live near wind turbines?
11   A. Absolutely.
12   Q. And you're aware that some of those people
13 complain of sleeplessness, correct?
14   A. Among other things, that's correct.
15   Q. And some of their complaints are
16 headaches, correct?
17   A. I have heard that, that's correct.
18   Q. And some people complain of feeling
19 nauseous, correct?
20   A. I'm not sure I've heard that one.
21   Q. Okay. Do you have any reason to
22 disbelieve that those people are feeling those
23 symptoms?
24   A. I take a person -- when they're telling me

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1 that information, that's called subjective
2 information, and I take it as it is.
3   Q. Okay. So you take their complaints at
4 face value, at least what they're feeling. Maybe
5 not the reasons for it but what they're feeling.
6   A. Well, it helps me go through the medical
7 process of trying to figure out exactly what's going
8 on.
9   Q. Okay. If someone came to you complaining
10 that they tripped or think they broke their ankle,
11 you would take X rays?
12   A. Not necessarily. I would do an exam first
13 and talk to them about what happened.
14   Q. Okay. If you thought it was broken, would
15 you take an X ray?
16   A. Probably would and would send it to a
17 radiologist.
18   Q. Okay. Obviously we can't take an X ray of
19 someone's head to see if they have a headache,
20 correct?
21   A. There are some things you can do that are
22 not X rays, but because of the nature of headaches,
23 there's a lot of different things you can do.
24   Q. Okay. Like what?

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1   A. You could even do an EEG for example. You
2 can do blood pressure checks for example. So
3 there's a number of things you do in order to
4 evaluate headaches.
5   Q. If you evaluate -- if you did those tests
6 and they came out negative, would you disbelieve
7 that the person had a headache?
8   A. Not necessarily, no.
9   Q. Okay. In essence, just because you can't
10 obtain objective proof of their complaint doesn't
11 mean that they are making it up, correct?
12   A. Never said that.
13   Q. I'm just asking a question.
14   A. Okay, I never said that, and so --
15   Q. Okay.
16   A. -- the point being that sometimes a
17 symptom is an entre to talk to somebody about a
18 problem.
19   Q. Okay. You make your living as a
20 consultant, correct, at this point?
21   A. That's correct.
22   Q. And all your work is through Exponent; is
23 that correct?
24   A. That is correct.

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1   Q. And at least in your background you have
2 consulted for the energy industry before, correct?
3   A. That is correct.
4   Q. Do you know how often?
5   A. No, I don't. I've done a lot of different
6 types of consulting in the last ten years that I
7 have worked for Exponent, so I don't have a number.
8   Q. How many years have you been working
9 consulting for energy industries, do you recall?
10   A. I don't -- I don't have a record of that.
11 So in that slide that I originally gave at
12 presentation, it listed the ones that I had done.
13   Q. Okay. Have you -- you haven't consulted
14 or you haven't testified at any hearings of this
15 type on behalf of individuals ever, have you?
16   A. Never been asked to.
17   Q. You act as a teacher of medicine, correct?
18   A. Excuse me?
19   Q. You've taught medicine?
20   A. I have.
21   Q. Okay. And you've taught preventive
22 medicine, correct?
23   A. And epidemiology.
24   Q. Okay. Preventive medicine is when you're

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1 trying to avoid health problems before they occur,
2 correct?
3   **A. That is correct.**
4   Q. And one of the things as a -- practicing
5 preventive medicine you're trying to do is prevent
6 health problems for people and populations, for one
7 person or more than one person, correct?
8   **A. That's part of it, that's correct.**
9   Q. In your testimony the first night, or it
10 wasn't the first night but the night for you, the
11 first night for you, you mentioned -- I think you
12 showed, talked about a nocebo effect, N-O-C-E-B-O?
13   **A. Nocebo effect, that's correct.**
14   Q. Okay. Could you explain again for us,
15 because I don't have it in front of me, exactly what
16 -- what you were talking about, what that nocebo
17 effect is?
18   **A. All right. In epidemiology, when you're**
19 **evaluating different outcomes, one of the things**
20 **that you have to guard against is a bias, several**
21 **different types of bias. And one of them has to do**
22 **with the nocebo effect; where if an individual**
23 **thinks the medication is going to help them, they**
24 **tend to report that it does, versus if they have a**

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1 **negative feeling about that, that they don't think**
2 **it will, then they are less likely to report a good**
3 **effect.**
4   **So it's a very common thing. It's not**
5 **derogatory. It's something that we in research see**
6 **quite a bit, and especially in pharmaceuticals, but**
7 **in other environmental exposures as well.**
8   Q. Am I correct that you showed individual --
9 individuals videos displaying the negative aspects
10 of wind turbines, is that what you said?
11   **A. Oh, in that particular study, one of the**
12 **studies -- it's one of the techniques that I was**
13 **talking about one of the studies uses. In one of**
14 **them they used -- they told them about the adverse**
15 **effects, and then in another I think there was some**
16 **sort of audiovisual prompting that was used.**
17   Q. Do you know what those audiovisual
18 promptings or those negative aspects were?
19   **A. I'd have to go back and look at that**
20 **particular paper.**
21   Q. You know what? I didn't hear the last
22 word. Somebody coughed and I missed it.
23   **A. Not a problem. I would have to go back**
24 **and look at that paper. I think it was one of the**

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1   **Crichton papers.**
2   Q. You testified I think, if I'm not
3 mistaken, that the complaints that have been lodged
4 against wind turbines are that they're basically an
5 annoyance. That's kind of where we ended up is that
6 they're -- wind turbines can be an annoyance; is
7 that correct?
8   **A. I think that that's what I was testifying**
9 **about, is the fact that that's what the**
10 **literature -- that's where it's gotten to the point.**
11 **Epidemiology is a continuing process, and so looking**
12 **at the literature all the way back from what, '93 I**
13 **guess to present, to begin to really hone it down to**
14 **focus in on annoyance.**
15   Q. Okay, as opposed to an actual health
16 concern, correct?
17   **A. Excuse me?**
18   Q. As opposed to an actual health concern; is
19 that correct?
20   **A. That is correct. A specific health**
21 **concern, let's put it that way.**
22   Q. And what do you mean by specific health
23 concern, I'm sorry?
24   **A. That it causes headaches, that it causes**

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1 **weight loss or weight gain, hair loss or hair gain.**
2   Q. The complaints that have been lodged
3 against wind turbine are subjective complaints for
4 the most part, correct?
5   **A. Self-reporting, so yes, subjective.**
6   Q. Okay. Would it be fair to say that those
7 complaints could be considered health effect
8 complaints though?
9   **A. No, they're self-reported health concerns**
10 **I guess would be what I would -- one way you could**
11 **put it.**
12   Q. Okay. As an epidemiologist, would it be
13 significant to you that individuals who had no
14 predetermined disposition as to wind farms started
15 having similar complaints after the wind turbines
16 started?
17   **A. I don't know of a study that has shown**
18 **that, so it would be interesting to see if you have**
19 **a study that shows that.**
20   Q. That's not my question, Dr. Roberts. The
21 question is would it be significant to you if that
22 did occur?
23   **A. Be significant if it was peer review**
24 **published because it would be very hard to do.**

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1   Q. Okay. It would be very hard to peer
2 review that?
3   **A. No, it would be very hard to do that**
4 **study.**
5   Q. Okay. So we don't have that kind of study
6 here?
7   **A. I'm not aware of that study. Pierpont**
8 **tried to do something in the crossover technique.**
9 **It was not successful in my opinion.**
10   Q. Would it be significant to you that when
11 people leave the area where the wind turbines are,
12 that their symptoms disappear?
13   **A. No, that wouldn't. That's one of the**
14 **things you have to look at in terms of like the**
15 **nocebo effect. For example, if they think they're**
16 **going to get better, that's a good stimulation for**
17 **getting better.**
18   Q. Okay. So that would be why people would
19 leave their homes permanently.
20   **A. I don't have any idea why people leave**
21 **their homes permanently.**
22   Q. Okay. You're aware that people have
23 abandoned their homes near wind turbines, correct?
24   **A. I have been -- I've been told that, I've**

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1 **heard that in meetings such as this, but I have not**
2 **personally talked to anyone that's done it.**
3   Q. Okay. What decibel level is a normal
4 conversation?
5   **A. The normal conversation, usually if we're**
6 **talking about in this room right now, I would say**
7 **that probably I'm doing about maybe 50, 55, but I'm**
8 **not -- I'm not an expert in noise levels.**
9   Q. Okay, but with the microphone or just you
10 and me talking?
11   **A. Just like I'm talking right now, but**
12 **again, it depends on the room.**
13   Q. Okay.
14   **A. It could be higher.**
15   Q. You would agree, would you not, if I spoke
16 to a person for eight hours straight while they
17 tried to sleep, that that very well could create a
18 lack of sleep?
19   **A. If you were doing it, yes.**
20   Q. That would also constitute an annoyance in
21 your mind if I was doing it, correct?
22   **A. That could be considered annoyance.**
23 **Depends on what you were telling me.**
24   Q. But if you were trying to sleep for eight

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1 hours and I wouldn't stop talking, would that be
2 considered an annoyance?
3   **A. To some people it could be.**
4   Q. And if this annoyance occurred every night
5 when someone tried to sleep for a year, a person
6 could be found to be sleep deprived, correct?
7   **A. No.**
8   Q. So if I talked to you every night for a
9 year and you were having a hard time sleeping, that
10 would not suggest that you may be sleep deprived?
11   **A. I thought you said sick, excuse me. If**
12 **you're not sleeping, then you're sleep deprived.**
13   Q. Okay. And lack of sleep or sleep
14 deprivation could cause other health problems,
15 correct?
16   **A. It has been linked to other problems, but**
17 **I'm not a sleep specialist. Dr. Ellenbogen will be**
18 **here the next time and he is.**
19   Q. But you would tell me -- but what are
20 those links, those other health concerns that have
21 been linked to sleep deprivation that you're aware
22 of?
23   **A. I'll just leave that let's ask him. I**
24 **wouldn't -- it's not my area.**

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1   Q. Are you aware of those areas, of those
2 concerns?
3   **A. Certainly as an physician I'm aware of it,**
4 **but I'm not ready to testify on what they are.**
5   Q. You're not going to testify as to what
6 you're aware of?
7   **A. It would be -- at this point I wouldn't --**
8 **I would not be considered an expert in that area.**
9   Q. Okay. You're aware of numerous hypotheses
10 by which wind turbines might cause health problems,
11 correct?
12   **A. I've seen a lot of them in literature,**
13 **that's correct.**
14   Q. And you phrased it that you're aware of
15 the hypothesis that wind turbines might affect the
16 citizenship?
17   **A. I have read that, that's correct.**
18   Q. And you're aware of the work done by Dr.
19 Salt, correct?
20   **A. Absolutely.**
21   Q. And he's done a lot of research regarding
22 the effect of sound on the ear, correct?
23   **A. Of the guinea pig.**
24   Q. And he's done a lot of research on the

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1 effect of low frequency sound, correct?
2 **A. At high levels.**
3 Q. He has concluded that it is incorrect to
4 assume that what we can't hear can't hurt us, hasn't
5 he?
6 **A. I'm not sure. I don't recall him saying**
7 **that. So if you've got an article, I'd be glad to**
8 **look at it.**
9 Q. Okay. The page numbers aren't numbered,
10 but I'm showing you what has been labeled UCLC
11 Exhibit 20. And this is a study or a report done by
12 Dr. Salt with Jeffrey Lichtenhan,
13 L-I-C-H-T-E-N-H-A-N; is that correct?
14 **A. That is correct.**
15 Q. Okay. If I bring your attention to the
16 bottom of page 5 and the top of page 6 -- they're
17 double sided, so like I said they're not numbered.
18 The last sentence on the bottom of page 5 reads, "On
19 this basis, we believe that the concept of what you
20 can't hear can't hurt you is false." Do you see
21 that?
22 **A. I see that.**
23 Q. Okay. Are you also -- are you familiar
24 with an article that Dr. Salt and Timothy Hullar,

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1 H-U-L-L-A-R, have written Response of the Ear to Low
2 Frequency Sounds, Infrasound and Wind Turbines?
3 **A. I would have to look at it and see, but I**
4 **would say -- is there anything you wish me to say**
5 **about this presentation he made?**
6 Q. I'm sorry, I didn't hear the question.
7 **A. Are we finished with this presentation?**
8 Q. With UCLC 20? Yes.
9 **A. Okay.**
10 Q. Okay, you have before you UCLC Exhibit 21?
11 That's the article I just mentioned.
12 **A. I do.**
13 Q. Okay. And if you go to page 8, Section 7,
14 conclusions.
15 **A. Did you say Section 8 or 7 conclusion?**
16 Q. Section 7.
17 **A. 7, excuse me.**
18 Q. Page 8, sorry.
19 **A. Got it.**
20 Q. If you look to subparagraph 4 of Section 7
21 it says, "A weighted wind turbine sounds
22 underestimate the likely influence of sound on the
23 ear." Do you see that?
24 **A. I see that.**

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1 Q. Would you agree with that statement or
2 disagree?
3 **A. I'd have to read the whole article to see.**
4 **There's a couple of things that just quickly come**
5 **out. This is a hypothesis-generated paper. He's**
6 **putting forth a hypothesis. I don't see data,**
7 **quickly looking at it, that proves that. It's**
8 **merely putting it out. If you took a look at the**
9 **conclusions in the first line, it says, "The fact**
10 **that some inner ear components, such as OHC, may**
11 **respond to infrasound." So that to me indicates**
12 **he's putting forth a hypothesis, one that he has**
13 **espoused other places.**
14 Q. Well, let's read the next sentence after
15 that. "On the contrary, though, if infrasound is
16 affecting cells and structures at levels that cannot
17 be heard, this leads to the possibility that wind
18 noise can be influencing function or causing
19 unfamiliar sensations." Correct? It says that?
20 **A. It says that.**
21 Q. Okay. Would you agree or disagree that
22 there is significant infrasound from wind turbines?
23 **A. I believe there's infrasound from wind**
24 **turbines. I'm not sure I would use the term**

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1 **significant.**
2 Q. Okay. Dr. Salt, you would agree, has done
3 a lot of research in this area?
4 **A. I didn't hear the question.**
5 Q. Would you agree that Dr. Salt has done a
6 lot of research in this area on infrasound?
7 **A. Dr. Salt has put forth a lot of hypotheses**
8 **in the literature concerning his research, that's**
9 **correct.**
10 Q. Okay. If you look at page 300 of UCLC
11 Exhibit 22, again this is in the Bulletin of
12 Science, Technology and Society written by Dr. Salt
13 and James Kaltenbach, K-A-L-T-E-N-B-A-C-H. If you
14 look at page 300, on the right-hand side, the first
15 sentence says, "We therefore conclude" -- the first
16 full sentence, excuse me.
17 **A. Excuse me, where are we?**
18 Q. Page 300.
19 **A. Got it.**
20 Q. Right-hand side.
21 **A. Got it.**
22 Q. There's two columns I guess.
23 **A. Got it.**
24 Q. The first full sentence says, "We

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1 therefore conclude that the dismissive statements
2 such as, quote, there is no significant infrasound
3 from current designs of wind turbines, end quote,
4 are undoubtedly false." Do you see that?
5 **A. I do see that.**
6 Q. Okay.
7 **A. Do you want me to respond to it?**
8 Q. No.
9 **MR. BLAZER:** I think he should be allowed
10 to respond to the statement. What's the relevance
11 of him reading something in the document if counsel
12 doesn't care what his response is to it? I think
13 this board certainly should care what the witness's
14 response is to that statement.
15 **MR. LUETKEHANS:** Well, this is my time to
16 ask questions. If he can answer the questions I
17 have --
18 **MR. BLAZER:** I don't think he was done.
19 **MR. LUETKEHANS:** I think he was.
20 **CHAIRMAN CORNALE:** Mr. Luetkehans, it is
21 your opportunity to ask the questions, so your
22 question was simply did he see that there.
23 **MR. LUETKEHANS:** Is that something that
24 Dr. Salt reported in this journal, that's the

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1 question, and the answer -- his answer was yes.
2 **CHAIRMAN CORNALE:** Yes. All right, we
3 will leave it at that.
4 **BY MR. LUETKEHANS:**
5 Q. One second, sir. If you go to page 301,
6 the next page of this report. About halfway down,
7 maybe a third of the way down on page 301, Dr. Salt
8 is of the opinion that -- the statement is made "So
9 in contrast." Do you see that?
10 **A. I see that.**
11 Q. Okay. "So in contrast, from our
12 perspective, there's ample evidence to support the
13 view that infrasound could affect people and which
14 justifies the need for more detailed scientific
15 studies of the problem." Correct?
16 **A. You read it correctly.**
17 Q. Would you agree with that statement?
18 **A. I don't know what his perspective is other**
19 **than the fact that he's a member of the Society for**
20 **Wind Vigilance, was a board member, so I don't know**
21 **what "our" perspective is.**
22 Q. Well, I guess the question is from your
23 perspective, would you agree that this is an issue
24 that deserves more detailed scientific -- justifies

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1 the need for more detailed scientific studies of the
2 problem?
3 **MR. BLAZER:** I'm sorry, could we get the
4 date of this?
5 **MR. LUETKEHANS:** It's 2011.
6 **MR. BLAZER:** Is that at the bottom there,
7 July 20th, 2011?
8 **MR. LUETKEHANS:** I believe so, and it's
9 also at the top on the first page. Bulletin of
10 Science, Technology and Society 2011.
11 **A. So could we do the question again please?**
12 Q. Would you agree that there is a
13 justification for the need for more detailed
14 scientific studies of the problem?
15 **A. As a researcher and as an epidemiologist**
16 **and a physician, I always answer yes to that**
17 **question.**
18 Q. Okay.
19 **A. The point being that this is in 2011 and**
20 **we're still getting papers as of November 2014, so**
21 **it's an ongoing -- as any medical condition, it's an**
22 **ongoing process of research.**
23 **CHAIRMAN CORNALE:** Mr. Luetkehans, while
24 you're preparing here, we have a member of the ZBA

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1 that would like to ask a question.
2 **MR. ZIMMERMAN:** I don't know if I will get
3 the names correct, but I will ask what your opinion
4 of the former statement was that you were shut off
5 with?
6 **A. Let's go back to it if I can find it.**
7 **CHAIRMAN CORNALE:** Okay, so the statement
8 was, "We therefore conclude that dismissive
9 statements, such as there is no significant
10 infrasound from current designs of wind turbines,
11 are undoubtedly false."
12 **A. And what page is that?**
13 **CHAIRMAN CORNALE:** It's on page 300 of the
14 Bulletin of Science, Technology and Society
15 submittal, right-hand column. Exhibit 22, the first
16 full sentence in the right-hand column.
17 **A. My concern there is the fact that it says**
18 **undoubtedly false. I don't -- I don't see the**
19 **information that would lead me to agree with that**
20 **statement. I would agree that it's in this paper, I**
21 **happen to disagree with the biases in the paper, but**
22 **my point is the fact that I don't believe they're**
23 **undoubtedly false.**
24 **CHAIRMAN CORNALE:** Thank you. Mr.

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1 Luetkehans.
2 **BY MR. LUETKEHANS:**
3 Q. One of the studies you cited in your
4 direct testimony was The Effects of Industrial Wind
5 Turbine Noise on Sleep and Health. Do you recall
6 that?
7 **A. Do you remember the author?**
8 Q. Hansen and Nissenbaum.
9 **A. Yes.**
10 Q. Okay. The study concluded that noise
11 emissions from wind turbines disturb sleep and cause
12 daytime sleepiness and impaired mental health in
13 residents living within 1.4 kilometers of a turbine,
14 correct?
15 **A. That's what they reported in the study.**
16 Q. In fact, the author stated that the levels
17 of sleep disruption and daytime consequences of
18 increased sleepiness together with the impairment of
19 mental health and that those responsive
20 relationships they observed in their study strongly
21 suggested that the noise from wind turbines resulted
22 in similar health impacts as other causes of
23 environmental noise, correct?
24 **A. I would have to read the paper. If you'll**

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1 **let me get the paper, I'll look at it.**
2 Q. Please.
3 **A. Okay, I have that paper in front of me out**
4 **of Noise and Health, September/October 2012, Volume**
5 **14.**
6 **CHAIRMAN CORNALE:** What's the exhibit
7 number on that?
8 **MR. LUETKEHANS:** Pleasant Ridge Exhibit
9 79.
10 **CHAIRMAN CORNALE:** 79.
11 Q. Page 240 I believe.
12 **A. All right, I'm looking at 240.**
13 **CHAIRMAN CORNALE:** Mr. Roberts, are you
14 ready? Mr. Luetkehans, go ahead.
15 **MR. LUETKEHANS:** Oh, I'm sorry, I thought
16 he was ready to answer the question I already asked.
17 **BY MR. LUETKEHANS:**
18 Q. And the question is, the author stated
19 that the levels of sleep disruption and daytime
20 consequences of increased sleepiness together with
21 the impairment of mental health and that those
22 responsive relationships they observed in this study
23 strongly suggest that noise from wind turbines
24 resulted in similar health impacts as other causes

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1 of environmental noise. Correct?
2 **A. I don't know where you're reading from.**
3 **Tell me where you're reading from please.**
4 Q. I'm reading from the right-hand column,
5 the -- I guess it's honestly the first full sentence
6 on the right-hand column.
7 **A. On page 237?**
8 Q. No, 240.
9 **A. 240, excuse me.**
10 Q. That's okay, I apologize. Take time to
11 read it.
12 **A. Here we go, here we go. Now I'm on page**
13 **240. Where are you?**
14 Q. Go to the right-hand column.
15 **A. Got it.**
16 Q. First full sentence.
17 **A. Levels of sleep disturbance?**
18 Q. Yes.
19 **A. Got it.**
20 Q. Let ask it again. In fact, the author
21 stated that the levels of sleep disruption and
22 daytime consequences of increased sleepiness
23 together with the impairment of mental health and
24 that those response relationships they observed in

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1 their study strongly suggested that the noise from
2 wind turbines resulted in similar health effects as
3 other causes of environmental noise. Is that
4 correct?
5 **A. That's what it says, and it gives a**
6 **reference of a 1 at the bottom of it, I'm not sure**
7 **about that, but that's what this biased study shows.**
8 Q. Okay. What the what study shows?
9 **A. This biased study, yes.**
10 Q. Okay. Why is it biased?
11 **A. Well, number one is Dr. Nissenbaum, when**
12 **he did the study, the 38 people -- he interviewed**
13 **the 38 people, his assistant interviewed the 41, the**
14 **cold call, and the second thing is that he's a**
15 **member of the board of directors of an anti-wind**
16 **turbine association called Society for Wind**
17 **Vigilance, and it was reviewed by two, one person**
18 **was a scientific advisor for them and the other was**
19 **a board of director, so I question the design and I**
20 **question the results.**
21 Q. However, it was a study that your counsel
22 put into evidence based upon your testimony,
23 correct?
24 **A. For to be as complete as I could and as**

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1 fair to the board, I put it in. I don't agree with
2 it, but I put it in.
3   Q. Okay. Are you aware of a study titled
4 Systematic Review 2013: Association Between Wind
5 Turbines and Human Distress?
6   A. Could you give me the author? I recognize
7 the author better than the titles.
8   Q. Okay. It was written by Ian Arra,
9 A-R-R-A, Hazel Lynn, Kimberley Barker, the next name
10 I'm just going to spell because I've got no chance,
11 C-H-I-E-B-E-R, last name O-G-B-U-N-E-K-E, and
12 Sophie, S-O-P-H-I-E, Regalado, R-E-G-A-L-A-D-O.
13   A. I'd have to look at it. I don't recognize
14 that one as it was read.
15   Q. Okay. My next question is do you
16 recognize this study, so if you want to take a
17 minute to look at it.
18   A. Please, because I recognize the author,
19 but I was not able to get it from this journal.
20   Yeah, I'm not going to be able to read the
21 whole thing while standing here right now, but
22 looking at the references, I recognize the
23 references. I recognize the methodology that's
24 being used. I'll try to answer your question.

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1   Q. Well, I guess the first question is do you
2 recognize this study?
3   A. I would --
4   Q. And if you don't, you don't. You don't
5 have to --
6   A. I recognize the author. I recognize the
7 title. I was not able to get this article.
8   Q. Okay.
9   A. And I'd like to keep your copy.
10   Q. You get to keep it.
11   A. Thank you.
12   Q. Would you agree with me that just because
13 Dr. Salt or other people have not yet been able to
14 prove to your satisfaction that wind turbines cause
15 these health problems doesn't necessarily mean there
16 is no association?
17   A. Association -- proving association is the
18 first step in proving causation, so I think it's a
19 good start.
20   Q. Okay. So you would say -- would you say
21 there is an association or not? I'm trying to
22 understand.
23   A. Right now, there's a -- his hypothesis is
24 there's an association. It's not been proven.

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1   Q. In your opinion, it has not been proven
2 that there's an association?
3   A. That is correct.
4   Q. Okay. In fact, the studies that you rely
5 on find that there is no association between wind
6 turbines and health effects, correct?
7   A. Specific health effects, that's correct.
8   Q. You know what, specific what? Specific --
9   A. Specific health effects.
10   Q. Health effects, I'm sorry. I thought you
11 said --
12   A. Not a problem. As long as she knows.
13   Q. Well, we'll help her. Would you also
14 agree, though, that these studies don't disprove
15 that wind turbines cause adverse health effects, do
16 they?
17   A. One of the problems that it's hard to
18 fathom, in epidemiology you can't prove the
19 negative.
20   Q. So in this case it hasn't been proven?
21   A. Nothing has been proven.
22   Q. Okay. You also talked about no peer
23 reviewed study showing causation between wind
24 turbines and health effects, correct? I think you

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1 testified that there's no peer reviewed studies that
2 show this causation.
3   A. That is correct.
4   Q. And it's also true that you have not
5 provided support with any peer reviewed studies that
6 prove to a degree of medical certainty that there is
7 no causation between wind turbines and health
8 effects, correct? Again, you can't prove or
9 disprove the negative.
10   A. I can't -- I can't prove a negative,
11 that's correct.
12   Q. In fact, it takes a long time, however,
13 for science to prove many things conclusively,
14 correct?
15   A. That's the way medicine is.
16   Q. So that's a yes?
17   A. That's the way medicine is.
18   Q. As you testified, there were originally
19 health concerns about the telephone and those proved
20 to be without merit, correct?
21   A. That is correct.
22   Q. There were also health concerns about
23 cigarettes for many years before it was
24 scientifically proved that they cause lung cancer,

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1 correct?
2 **A. Absolutely.**
3 Q. And for a long time the tobacco industry
4 denied smoking caused lung cancer, didn't it?
5 **A. I don't know that firsthand, but I've**
6 **certainly seen it in the literature.**
7 Q. Okay. And between the time that people
8 started smoking and the time it was conclusively
9 proven that cigarette smoking caused lung cancer, a
10 lot of people suffered adverse health effects as a
11 result of smoking cigarettes, correct?
12 **A. I believe that's a true statement.**
13 Q. Would it be fair to say that science is
14 still trying to quantify the relationship, if any,
15 between wind turbines and subjective health
16 complaints that people make?
17 **A. I'm not sure I would use the term**
18 **quantify. I think to explore it, to plumb it, to**
19 **find out exactly what might be the cause of the**
20 **annoyance.**
21 Q. Okay. But there's no denying that some
22 people experience these symptoms near wind turbines,
23 correct?
24 **A. There's no denying that people report**

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1 **those, that's correct.**
2 Q. Okay. And that has occurred in many areas
3 throughout the United States and other countries,
4 correct?
5 **A. It's --**
6 Q. People reported those problems.
7 **A. Self-reporting has occurred, that's right.**
8 Q. You said I think in your testimony the
9 first night we need a way to validate those health
10 problems, correct?
11 **A. That's one of the things that an**
12 **epidemiologist does in doing studies.**
13 Q. And at some point you were able to
14 validate that phones did not create health problems,
15 correct? The telephone.
16 **A. Eventually there -- part of it is the fact**
17 **that they got more experience with it. Finally the**
18 **studies were negative and they stopped doing them**
19 **because you can't get negative studies published**
20 **anymore in literature.**
21 Q. We do not have a validation that these
22 health problems are related or unrelated, correct,
23 to wind turbines?
24 **A. Actually we have a number of studies that**

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1 **we can draw on and answer the question as of today.**
2 Q. And are any of those studies peer
3 reviewed?
4 **A. Nearly all of them are peer reviewed.**
5 Q. They're all peer reviewed. Which --
6 **A. I said nearly all of them, not all of**
7 **them.**
8 Q. Which studies would you rely upon then?
9 **A. Actually there's two sets. One would be**
10 **the ones that are published in peer reviewed**
11 **journals. The other set would be the review panels**
12 **that have been done by governmental agencies and**
13 **public health departments.**
14 Q. Okay, the peer reviewed in journals, did
15 you submit those as part of the exhibits? Which
16 one -- which peer reviewed articles have been
17 submitted as part of your exhibits that show that
18 there is no causation between wind turbines and
19 health effects?
20 **A. Well, I listed -- I attempted to list a**
21 **good -- at that point what I thought was a good**
22 **listing of the peer reviewed articles, not all of**
23 **which were good, that I used in my presentation, and**
24 **that's -- it would be on page 21. There's 14**

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1 **studies there. Actually I know of more studies now,**
2 **but that's the ones I listed at the time I made the**
3 **presentation.**
4 Q. So all 14 of those health studies, of
5 those studies, are peer reviewed and show and prove
6 that there is no -- that there is no causation
7 between health problems and wind turbines, is that
8 what you're saying?
9 **A. No, that's not what I said.**
10 Q. Okay.
11 **A. I said number one is that I believe all of**
12 **these are peer reviewed. Number two is I said I**
13 **don't believe in some of the assumptions that are**
14 **made nor do I testify to their quality, but what I**
15 **have said is that these articles do not prove that**
16 **there's a cause and effect relationship between wind**
17 **turbines and a specific health effect.**
18 Q. So they don't prove it, that's what you're
19 saying.
20 **A. They do not prove that there is one,**
21 **that's correct.**
22 Q. Okay. And there's no articles -- my
23 question, I guess maybe we got confused somewhere
24 between you and me, but my question was are there

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1 any peer reviewed articles that show that there is
2 no causation?
3   A. **You can't prove the negative.**
4   Q. So the answer is no.
5   A. **The answer is no.**
6   CHAIRMAN CORNALE: Dr. Roberts, just to
7 clarify real quick, can you tell me what exhibit
8 number that is on page 21?
9   A. **It's my presentation.**
10   MR. LUETKEHANS: I can find it. I think
11 it's Pleasant Ridge Exhibit 96. Correct, Mike?
12   MR. BLAZER: The presentation?
13   MR. LUETKEHANS: The Power Point.
14   A. **My full presentation.**
15   MR. BLAZER: Is 96, yes.
16   CHAIRMAN CORNALE: 96 all right. Pleasant
17 Ridge Exhibit 96, page 21, has a listing of those.
18   A. **That is correct.**
19   CHAIRMAN CORNALE: Very good, thank you.
20 BY MR. LUETKEHANS:
21   Q. So we have no proof one way or another
22 that if this wind farm is designed, that it will not
23 create health problems similar to those that other
24 people have complained of in other states or within

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1 this state, correct?
2   A. **There are two different -- two aspects to**
3 **that question. One is the fact that I can't prove**
4 **something about regulations. I'm not here to talk**
5 **about regulations. All I can say is the fact that**
6 **there is no -- in these studies, the peer reviewed**
7 **literature and cross-sectional studies and the**
8 **committee reviews do not indicate there is a**
9 **specific disease associated with wind turbines.**
10   Q. And they do not indicate that there is no
11 specific disease with wind turbines either, correct?
12   A. **You're -- it's not possible to do that.**
13   Q. Okay. From your perspective, is there any
14 reason to have any regulations at all about
15 locations of wind turbines?
16   A. **I believe there is.**
17   Q. Why?
18   A. **I --**
19   Q. From a health perspective, I'm sorry.
20   A. **From a health perspective, one of the**
21 **things that we see in the literature is the fact**
22 **that one of the things that we can point to is there**
23 **appears to be an annoyance factor with wind**
24 **turbines. Now, whether it's the location of them,**

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1 **the color of them, the hours that they run, that I**
2 **can't answer that part of the question, but what I**
3 **can say is that the literature says there's**
4 **annoyance associated with them. So I think that in**
5 **this day and time personally regulations are**
6 **important.**
7   Q. Okay. You mentioned a number of times
8 that the experiments Dr. Salt has were done on
9 animals not humans, correct?
10   A. **Guinea pigs.**
11   Q. In fact, some of the testing would have
12 been unethical or illegal to do on humans, correct?
13   A. **What he was doing, yes.**
14   Q. Okay. In fact, scientists perform tests
15 on animals and correlate the results of those tests
16 to humans very often, correct?
17   A. **It can be done. That's the way that**
18 **hypotheses are generated, but as EPA puts it, if**
19 **you've got human data, you use human data over**
20 **animal data.**
21   Q. Okay. And Dr. Salt could not provide
22 human data because that would be unethical, correct?
23   A. **As a member of the -- of my institutional**
24 **review board, I wouldn't approve it on any humans,**

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1 **that's correct.**
2   Q. Okay. Do you agree that low frequency
3 sound can have an adverse impact on human health
4 regardless of its source?
5   A. **One of the things that -- I'm not a**
6 **acoustician, but one of the things that I see is the**
7 **fact that the sound level, the decibels, is very,**
8 **very important in any noise, so I can't answer, I**
9 **can't answer that without you telling me the sound**
10 **pressure.**
11   Q. Well, just any -- when you say that low
12 frequency, is there any time where you're aware of
13 low frequency that can have an adverse impact on
14 human health?
15   A. **Well, I mean at high levels you can**
16 **actually -- I mean when you really -- according to**
17 **the literature, when you really ramp it up, you can**
18 **have. And there are researchers in Europe that**
19 **claim that there's a thing called vibroacoustic**
20 **disease when you're pushing the levels up at 140,**
21 **130 decibel level with low frequency, so it's a very**
22 **high level.**
23   Q. And that low frequency is a frequency that
24 can't be heard by humans, correct?

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1 A. That's right.
2 Q. Okay. So it's possible that sounds you
3 cannot hear can, in fact, be damaging to the humans,
4 to humans, correct?
5 A. If it's at high enough level decibels.
6 Q. You put a lot of emphasis on peer reviewed
7 studies, correct?
8 A. I do. As a scientist I do.
9 Q. Okay. Would it be fair to say that
10 reviewers often don't get the underlying data that's
11 being analyzed in peer reviewed articles?
12 A. That is correct.
13 Q. When it comes to self-reported events,
14 peer review cannot vouch for the accuracy of the
15 data; is that correct?
16 A. For self-reported, they can look at how
17 it's actually collected, but the actual quality of
18 that, they can't tell.
19 Q. So that's correct?
20 A. Not totally correct.
21 Q. What parts are not correct?
22 A. What I'm saying is you have to look at how
23 that self-reported was obtained.
24 Q. Do you have any reason to disagree with

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1 Dr. Salt that the outer hair cells of the ear are
2 stimulated by noise that we cannot hear?
3 A. I see it as a hypothesis. I'm not -- I
4 have not seen any literature that that's been
5 accepted as a fact.
6 Q. So we don't know if the hypothesis is
7 correct or incorrect at this time. Is that a fair
8 statement?
9 A. It's a hypothesis out there to be tested
10 by others.
11 Q. Okay. And to date, that hypothesis has
12 not been fully tested to your satisfaction, correct?
13 A. To prove whether it's true or not.
14 Q. So is that correct?
15 A. It has not been proven true or false.
16 Q. Correct. Okay. To your knowledge, has
17 Dr. Salt conducted his research using standard
18 scientific methodology?
19 A. The papers that I have seen have been more
20 of review papers, so I have not looked at his
21 methodology that carefully other than to see what
22 animals he was testing and the levels.
23 Q. So at this point you don't know if he was
24 using standard scientific methodology or not?

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1 A. I couldn't testify to that, that's
2 correct.
3 Q. Do you have any reason to believe he is
4 not using standard scientific methodology?
5 A. I wouldn't be able to testify one way or
6 the other without looking at it.
7 Q. Okay. Do you have enough information from
8 your own knowledge from the studies that you've done
9 and reviewed that the ear is sensitive to sounds
10 generated by wind turbines?
11 A. I'm sorry, I didn't understand the
12 question.
13 Q. Okay. Do you have enough information from
14 your own knowledge and from the studies that you've
15 read and reviewed that the ear is sensitive to sound
16 generated by wind turbines?
17 A. At higher levels, yes, but I don't know at
18 the situation when the wind turbine's at low
19 frequency.
20 Q. Okay, but we're not -- I'm not asking
21 anyone to choose the decibel level. But at some
22 decibel levels you would agree there is some
23 sensitivity to that sound.
24 A. Again, I can't answer the question unless

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1 we talk about the level of it because the literature
2 indicates that we can't hear the lower, the low
3 frequency, the ultra low frequency.
4 Q. Okay. How about the higher frequencies?
5 A. Well, I mean between 20 and 20,000 hertz
6 we can hear just fine.
7 Q. How about 1,000 hertz at 50 decibels?
8 A. I can't -- I can't do that. I can't
9 answer that question for you.
10 Q. So you don't know that answer?
11 A. I don't know that answer.
12 Q. Are you suggesting that people who have
13 health complaints, the reason they have those
14 complaints is a bias against wind turbines or are
15 there other reasons as well?
16 A. Well, one of the things is that I go to
17 literature and I look at the published articles, and
18 there are articles that do indicate that there is an
19 aspect to -- at least like we talked about before,
20 it goes back to the nocebo effect where an
21 individual either decides negatively about them or
22 positively about them, and there's some people that
23 do not complain about wind turbines and others do.
24 We don't know exactly what goes into it, so --

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1 Q. I didn't mean to cut you off.
2 A. Okay, go ahead.
3 Q. Do you know whether -- do you have an
4 opinion as to whether all the people who have health
5 complaints are biased against wind turbines?
6 A. I don't have an opinion that all the
7 people are biased either way.
8 Q. Okay. So people with health complaints,
9 some may be biased, some may not be.
10 A. Well, I think it's one of the -- it's
11 really one of the things you have to think about
12 when you're reading the self reports is what a
13 person feels about that condition. I mean it
14 doesn't have to be wind turbines. It can be cars or
15 whatever. So you have to think about that in
16 reading scientific papers about self-reporting.
17 Q. Okay. But in your opinion, do all the
18 people who have health complaints related to wind
19 turbines have a bias against wind turbines?
20 A. I won't say all to anything.
21 Q. Okay. So we don't know whether all of
22 them do, some of them or what. We have no idea.
23 A. Well, I mean if you go back to the
24 literature and you look at Taylor's paper, you look

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1 at Crichton's paper, you look -- to a certain extent
2 you look at Pedersen. They each indicate some
3 evidence of why those people are annoyed.
4 Q. Some evidence, correct? Some evidence you
5 said?
6 A. Some evidence, that's correct.
7 Q. You haven't done any actual studies
8 yourself, any clinical studies on this issue,
9 correct?
10 A. Clinical studies on wind turbines?
11 Q. Yes.
12 A. No.
13 Q. Okay. You're just really here to testify
14 as to what you've read on the reports.
15 A. What I have reviewed and the paper I
16 published.
17 Q. Okay. The paper you published, I'm sorry?
18 A. Roberts and Roberts 2013.
19 Q. Okay.
20 A. Actually Jennifer Roberts was the first
21 author, so I have to say she published it.
22 Q. And is that one of the documents that you
23 presented in your testimony?
24 A. I believe I mentioned it. I certainly

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1 included it in the material that I submitted.
2 MR. BLAZER: Exhibit 88.
3 Q. Okay. I don't want to do this as a memory
4 test, so if you have Pleasant Ridge Exhibit 88?
5 A. Yeah, let me get it.
6 Q. And for the record, we're talking about
7 Pleasant Ridge Exhibit 88.
8 A. I have it in front of me.
9 Q. Okay. Why don't you go to page 13 in that
10 study? Actually conclusion.
11 A. I'm on page 13.
12 Q. This is a study with Jennifer Roberts you
13 said?
14 A. Jennifer Roberts is the first author.
15 Q. Okay. And is she related to you?
16 A. No, she's not.
17 Q. Okay. If we go to the conclusion, about a
18 third of the way down in the conclusion, it says
19 "The association of a particular pathway between
20 health effects specifically generated from wind
21 turbines, annoyance and adverse physical health
22 effects have yet to be fully characterized." Is
23 that fair to say?
24 A. That is correct.

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1 Q. And you agree with that statement?
2 A. Yes.
3 Q. Just wanted to make sure. And it also
4 goes on about two sentences later to say "Hence, the
5 research on the potential health effects claimed as
6 a result of exposure to sound generated by wind
7 turbines is essential to determine if an actual risk
8 exists." Do you see that?
9 A. I do.
10 Q. Again, you agree with that statement,
11 right?
12 A. Yes, sir, I do.
13 Q. So, in essence, that statement says we
14 need more research.
15 A. Well, like I said earlier in this
16 testimony, I don't think you'll find any
17 epidemiologist that will ever say enough research
18 has been done. I think it's an ongoing process. I
19 think that it's something that's -- it's important
20 for us all to know about.
21 Q. And unlike telephones, no one's stopped
22 doing that research. People are still doing it.
23 A. People stopped doing it when enough
24 information became available to indicate that it

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1 wasn't a cause of tinnitus in users of telephones.
2 Q. We may have gone over this, but I've just
3 got to make sure I -- you state that there is no
4 affirmative proof that there is no association
5 between noise from wind turbines generally and
6 adverse health effects, correct?
7 A. Are you reading a statement from --
8 Q. No, just a general statement.
9 A. Okay, please repeat it.
10 Q. That's fine. You state you believe that
11 there's no affirmative proof that there is no
12 association between wind noise from wind turbines
13 generally and adverse health effects, correct?
14 A. You've got a double negative in there.
15 Can you clarify that? I mean --
16 Q. Do you believe there is affirmative proof
17 that there is -- you don't believe that there's
18 affirmative proof that there is an association
19 between wind turbines and adverse health effects,
20 correct?
21 A. A specific adverse health effect, that's
22 correct.
23 Q. There is literature that suggests that
24 link; you just don't agree with it.

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1 A. There are hypotheses that have been put in
2 the literature, but I don't agree with it.
3 Q. And there is literature that suggests that
4 there's not a cause-and-effect relationship between
5 wind turbines and health complaints, correct?
6 A. I have not found that yet.
7 Q. So you don't think there is literature
8 that suggests that there is no cause-and-effect
9 relationship between wind turbines and health
10 complaints?
11 A. I think that the literature tells us that
12 there is an association between the noise, but
13 there's not an association of specific health
14 effects.
15 Q. Okay, I'm not sure -- and I'm not trying
16 to -- I don't believe you heard my question
17 correctly because -- I'm not sure.
18   The question I have is the literature does
19 not suggest in your mind that there is a
20 cause-and-effect relationship between wind turbines
21 and health complaints.
22 A. I believe the literature says there's not,
23 that's correct.
24 Q. And that literature is good enough for you

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1 to stand here and testify today.
2 A. I'm testifying today on what the
3 literature is today as far as I know, peer reviewed
4 published literature.
5 Q. Okay, but you don't agree with the
6 contrary literature that's out there, correct?
7 A. Those are hypotheses that have not been
8 proven.
9 Q. And neither has -- the alternative has not
10 been proven.
11 A. I think I presented what has been proven,
12 has been shown.
13 Q. Which is nothing's been proven.
14 A. No, I didn't say that. I said that
15 there's been an association with annoyance and wind
16 turbines.
17 Q. Okay.
18 A. There's a number of factors that are
19 associated with that.
20 Q. And we don't know whether that -- whether
21 wind turbines -- we don't know as we sit here today
22 whether wind turbines actually cause health problems
23 one way or the other.
24 A. The studies that have been done so far do

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1 not show there is a specific health effect
2 associated with wind turbines.
3 Q. And none of the studies show that there is
4 no effect either because you can't prove the
5 negative, correct?
6 A. That -- I have testified twice to that
7 now.
8   MR. LUETKEHANS: Nothing further.
9   CHAIRMAN CORNALE: Thank you. It's a
10 quarter after 9:00. I think it's a good place to
11 stop for the evening.
12   MR. SCHOPP: Discuss a calendar for future
13 meetings or on Wednesday?
14   CHAIRMAN CORNALE: We'll look at the
15 calendar on Wednesday for future meetings. We for
16 sure are back in this location at 6:30 on Wednesday
17 evening. So Wednesday evening, 6:30, back here.
18 And we'll talk about at that point future meetings.
19   Additionally available for questioning,
20 the applicant will have Hankard will be here for
21 public questions, Roberts will be here for some
22 questions from us and the public, Ellenbogen will be
23 here that evening. Mr. Parzyck will be here that
24 evening. So Wednesday evening, 6:30. Anything else

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1   I need, Chuck or counsel?

2   All right. With that, I need a motion to

3   recess.

4   **MR. ZIMMERMAN:** I move.

5   **CHAIRMAN CORNALE:** Zimmerman makes the

6   motion.

7   **MR. VITZTHUM:** I'll second.

8   **CHAIRMAN CORNALE:** Vitzthum seconds the

9   motion. All in favor?

10   **ALL MEMBERS:** Aye.

11   **CHAIRMAN CORNALE:** Opposed.

12   (Adjourned at 9:16 p.m.)

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1   STATE OF ILLINOIS   )
)SS
2   COUNTY OF FORD   )

3

4   I, June Haeme, a Notary Public in and for
    the County of Ford, State of Illinois, do hereby
5   certify that the following Livingston County Zoning
    Board of Appeals, Case SU-7-14 hearing was taken at
6   the Walton Centre, 100 West Locust Street, Fairbury,
    Illinois, on December 15, 2014.
7   That the said deposition was taken down in
    stenograph notes and afterwards reduced to
8   typewriting under my instruction and that the
    deposition is a true record of the testimony given.
9   I do further certify that I am a
    disinterested person in this cause of action; that I
10   am not a relative, or otherwise interested in the
    event of this action, and am not in the employ of
11   the attorneys for either party.
         IN WITNESS WHEREOF, I have hereunto set my
12   hand and affixed my notarial seal this 23rd day of
    December, 2014.

13

14

15
                         JUNE HAEME, CSR
16   NOTARY PUBLIC

17

18   "OFFICIAL SEAL"
    June Haeme
19   Notary Public, State of Illinois
    My Commission Expires:
20   September 27, 2016

21

22

23

24

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